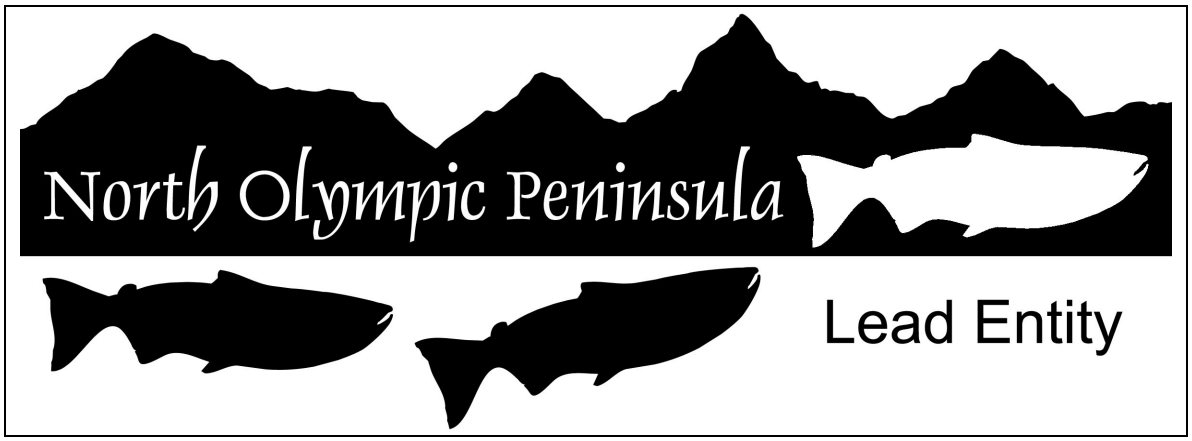

North Olympic Peninsula Lead Entity

Salmon Habitat Recovery Project Strategy

2004 Project Strategy
Version 003.5

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Executive Summary of NOPLE Strategy
Version 003.5 (2004)

Introduction

1. The North Olympic Peninsula Lead Entity (NOPLE) geographic area

The North Olympic Peninsula Lead Entity (NOPLE) geographic area encompasses 8,051 salmon river and coastal miles located within 90 independent watersheds and 2 unique coastal systems over 2,330 square miles with management under two counties, three cities, five native tribes, 3.5 WRIAs (20, 19, 18 and part of 17), a National Park, a National Forest, a Marine Sanctuary, extensive State trust lands, large private timber companies, and, of course, individual ownership.

A map of the North Olympic Peninsula "Geographical Units" (major watersheds and watershed groups) is located in the Strategy, at p 127.

2. The NOPLE organization

NOPLE consists of two organizational groups and four citizen groups. The Lead Entity Group (LEG) consists of representatives of each of the ten entities that make up NOPLE: 1) Clallam County, 2) Jefferson County, 3) Jamestown S'Klallam Tribe, 4) Lower Elwha Klallam Tribe, 5) Makah Tribe, 6) Quileute Tribe, 7) Hoh Tribe, 8) City of Sequim, 9) City of Port Angeles, and 10) City of Forks. The LEG meets monthly and uses socio-political and community interest criteria and factors when considering Technical Review Group (TRG) and Citizen Facilitation Group (CFG) recommendations in updating the NOPLE Strategy, and when considering TRG and CFG scores, ranks and comments in finalizing the prioritized project list to be submitted to the SRFB.

The Technical Review Group (TRG) consists of thirteen technical representatives, one appointed by each of the ten NOPLE entities and three at-large positions. Current members include tribal, state and local government biologists, a geologist, a utility engineer, an environmental consultant, and several citizens with extensive local and historical knowledge. The TRG meets monthly to develop and recommend Strategy updates based on scientific and technical criteria and factors, to provide technical assistance and feedback to SRFB applicants, and to provide the CFGs and LEG with scores, ranks and comments on proposed SRFB projects.

There are currently four Citizen Facilitation Groups (CFGs), one each for WRIA 19 and WRIA 20, and two for WRIA 18, which are the Dungeness River Management Team (DRMT) and the Elwha Morse Management Team (EMMT). CFGs generally meet monthly and provide feedback and input on Strategy updates, develop potential projects, and provide the LEG with scores, ranks and comments on proposed SRFB projects within their geographic area.

3. What is new in the NOPLE Strategy Version 003.5 (May 2004)?

The NOPLE Strategy Version 003.5 (May 2004) is substantially the same as Version 003 (2003). A minor update was made in January 2004 with Version 003 when the watershed

data tables were updated and the tiering designation of some NOPLE watersheds was adjusted. Another minor update was made in May 2004 with Version 003.5 when Appendix C was adopted ("Default Prioritization for Watersheds without Prioritized Lists"), with notice and an opportunity to comment to all NOPLE preproposal applicants well before the NOPLE due date of SRFB applications.

The NOPLE Strategy Version 003.5 (May 2004) is the "NOPLE Strategy" that is submitted to the SRFB as part of the Round 5 Deliverables due July 16, 2004. NOPLE is currently working on a more substantial update of the Strategy that should be accomplished in time for the SRFB Round 6 in early 2005 with Version 004. This update will follow the format suggested in the SRFB Guide for Strategy Development, will reflect additional Limiting Factor and Necessary Actions information that has come to light since 2001, and will include a prioritization on a reach-level scale of all Tier 1 and Tier 2 watersheds and the nearshore.

Scientific Information and Technical Foundation

1. What are the stocks and their status in your area?

Information about the NOPLE salmon stocks can be found in the NOPLE Strategy on the following pages:

a. Strategy pp 5 - 6 ("Stock Status and Trends")
b. Strategy p 14 ("Table 2: Stock Status and Trends Summary")
c. Strategy p 23 ("Table 4: Hatchery Information")
d. Strategy pp 24 - 25 ("Appendix A: Stock Status per Watershed")

The NOPLE area provides habitat for stocks of eight salmonid species, including four listed stocks. Listed as threatened and in need of recovery are Puget Sound Chinook, Eastern Strait of Juan de Fuca & Hood Canal Summer Run Chum, Lake Ozette Sockeye, and Bull Trout.

The NOPLE area also provides habitat for many strong stocks of chinook, chum, coho, steelhead, and pink salmon, as well as cutthroat trout and two unique stocks of trout in the Crescent-Lyre Basin, and a unique stock of Lake Pleasant sockeye in the Sol Duc System, all of which are worthy of protection.

2. What are the priorities and goals for these stocks? What is the technical basis for these decisions?

NOPLE's priorities and goals for its stocks are explained in the NOPLE Strategy, at pp 1-2 ("Mission Statement," "Philosophy," and "Goals"). It is NOPLE 's goal "to achieve genetically diverse, self-sustaining salmon populations that will support healthy ecosystems and ceremonial, subsistence, recreational and commercial fisheries." To achieve this goal, NOPLE has adopted the dual priorities of "maintaining or strengthening the strong stocks while restoring productive habitat for the weak stocks."

To effectuate the dual prioritization of "protecting the best while restoring the rest" over an area of 90 independent watersheds containing four listed and various healthy stocks of

eight distinct salmonid species, NOPLE devised a system of prioritizing geographic areas, based on scientific and technical criteria as well as socio-political considerations.

A description of the NOPLE prioritization method is described in the NOPLE Strategy, at pp 3-5 ("Project Strategy development Process and Methods"). A flowchart depicting the NOPLE prioritization method is found in the NOPLE Strategy, at p 4 ("Figure 1").

3. What are the limiting habitat feature(s) and/or watershed processes limiting recovery? Which are the most important ones?

The limiting habitat features and/or watershed processes for the NOPLE watersheds are contained in Appendix E of the Strategy, at pp 97-125 ("NOPLE Limiting Factor and Actions Priorities"). These are summaries of the major recommendations from the Limiting Factor Analyses for WRIAs 17, 18, 19 and 20. For the next Strategy version, this section will be updated with additional information and specific data gaps will be identified. Major limiting factors affecting NOPLE are:

a. Land development: channelization, riprapping and diking
b. Forest, hatchery and agricultural practices
c. Water withdrawals, fish barriers, and lack of woody debris
d. Shoreline development and bluff bulk-heading
e. Data gaps.

Although not explicity stated in the Strategy, the watershed processes most important for NOPLE watersheds are:

a. Hydrologic regime
b. Sediment supply
c. Primary and secondary productivity
d. Organic matter flow
e. Heat and light inputs
f. Nutrient and chemical inputs.

Nearshore ecological processes are summarized on pp 66-68 of the Strategy, as part of the section on "Salmon Recovery in the Nearshore: A Shared Framework for the Hood Canal Coordinating Council and North Olympic Peninsula Lead Entities." These nearshore ecological processes include primary productivity, secondary productivity, organic matter flow (movement of plant and animal material (live, decaying or dead) among locations within the system), nutrient cycling, sediment processes (erosion, transport, deposition, storage), and hydraulic processes (tides, currents, shoreline erosion, sedimentation). Figure 3 on p 73 of the Strategy summarizes the impacts of human stressors in the nearshore on the ecology, economy, and social structure of the North Olympic Peninsula.

4. What are the major actions necessary to protect and improve the stocks?

The actions identified in the NOPLE Strategy at p 2 are designed with the following goals in mind:

- Maintain and improve ecosystem productivity and genetic diversity

- Protect highly productive habitats and populations and restore impaired habitat and populations with productive potential
- Utilize the best available science to set regional priorities
- Recognize socio-political factors in decision making, and
- Provide direction and focus for project sponsors.

Specific actions necessary to protect and improve the stocks for various NOPLE watersheds are listed in Appendix D of the Strategy, at pp 28-96 ("Completed Prioritized Lists of Activities and Concepts"). For the next Strategy version, this section will be updated with additional necessary actions that have been identified in relevant assessments, analyses, reports and studies.

For those North Olympic Peninsula watersheds that do not yet have a prioritized list developed for them in Appendix D, NOPLE refers to Appendix C of the Strategy, at p 27 ("Default Prioritization for Watersheds without Prioritized Lists"), which outlines the hierarchical restoration actions strategy developed by Roni et. al. 2002 as a guide in determining the priority of the various types of actions, as well as the major recommendations from Limiting Factor Analyses, Watershed Analyses, or more recent assessments.

5. What are your priority actions and/or geographic areas based on scientific information? What is the basis for the priorities?
The NOPLE priority geographic areas are described in the Strategy, at pp 10-17 ("Tiered Geographical Units"). They are as follows, with Tier 1 designating the highest priority geographic areas:

Tier 1 Watersheds	Tier 2 Watersheds	Tier 3 Watersheds	Tier 4 Watersheds
Dungeness Basin	Clallam River	Central Strait Clallam Independents	Urban Independents
Elwha Basin	Deep Creek	Eastern Strait Clallam Independents	
Hoh Basin	East and West Twin	Ennis Basin	
Hoko Basin	Jimmy-Come-Lately Basin	Goodman Complex	
Crescent-Lyre Basin	Pysht Basin	Sequim Bay	
Morse Basin	Salt Basin	Waatch Complex	
Nearshore	Sekiu River	Valley Basin	
Ozette Basin		Western Strait Clallam Independents	
Quillayute Mainstem			
Bogachiel			
Calawah			
Dickey			
Sol Duc			

The criteria for these priorities are described in the Strategy, at pp 6-7 ("Scientific and Technical Criteria and Factors"), which include:

a. Stock Status and Trend Information

b. Productivity (historic, current, potential)
c. Diversity (stock information and ESA listing)
d. Habitat (basin size and land-use patterns)
e. Hatchery Practices.

A table showing the results of applying these criteria to the NOPLE watersheds can be found in the Strategy, at p 26 (" Appendix B: Project Strategy Development Data").

A table showing how results were used to determine an initial tier determination can be found in the Strategy, at p 9 ("Table 1: General Tier Guidelines").

Community Interests

1. How do you assess community interests and support for actions necessary to protect and improve salmon stocks?

The Strategy, at pp 7-8 ("socio-political considerations") lists the community interests to be considered by NOPLE:

a. Geographic Equity
b. Small Watershed Stewardship Groups
c. Economic Concerns
d. Conflicts
e. Public Support – Outreach and Education
f. Improvements in Project Quality
g. Property Tax Benefits.

Community interests for salmon recovery actions is assessed both formally and informally. Formally, community interests are represented by:

a. The LEG members, each of which represents a local NOPLE governmental or tribal entity, and
b. The CFGs, whose input and feedback is formally considered in updating the Strategy and developing the prioritized project lists.

Informally, community interests are communicated to NOPLE through:

a. Networking, cross-memberships, and working relationships between NOPLE and citizen based organizations
b. Consideration by NOPLE in updating the Strategy of local watershed analyses, reports, studies and assessments, many of which include community interests elements
c. Participation of citizens in NOPLE subcommittees that are working to identify actions, prioritize reaches, and update the Strategy
d. Working with NOPLE representatives in developing projects and applying for SRFB funding.

2. What types of biologically based high priority projects, geographic areas and actions currently enjoy the community support necessary for successful implementation? (In reference to Figure 1, where is the overlap in science-based priorities and community priorities?)

Historically, NOPLE watersheds were abundant with many strong stocks of salmon. These populations were large enough to support multiple tribal communities, extensive commercial harvests, and legendary sports fisheries.

The continuing primary importance of healthy salmon stocks to the economy and culture of all ten NOPLE entities is reflected in the broad community support for local salmon protection and restoration activities. Below is a map showing the geographic range of funded SRFB projects to date illustrating the broad level of community support for salmon recovery.

3. What types of biologically based high priority projects, geographic areas and actions do not currently enjoy the community support necessary for successful implementation and why?
Not widely supported are actions to remove existing bluff bulkheading and riprap, because doing so would affect the stability of developed properties located above.

Also not widely supported are high-cost actions within urban areas that are likely to be of low certainty of success or benefit to salmon, with such an abundance of alternate opportunities available for priority projects with high certainty of success and benefit to salmon.

4. Do you have a strategy or set of actions to increase the community support necessary for successful implementation of these priority actions and areas? If so, briefly describe the strategy and proposed actions.
The NOPLE plan of action to increase community support for the NOPLE Salmon Habitat Restoration and Recovery Strategy is outlined in the NOPLE Community Outreach Plan entitled "NOPLE Who, Why, What, How and YOU!" which can be found in the Strategy, p. xii. The goals of the NOPLE Community Outreach Plan are to:

a. Educate the public about salmon protection and recovery efforts and opportunities to get involved
b. Solicit letters of support for the NOPLE Strategy from community entities, organizations and groups
c. Identify potential partner opportunities for identified priority actions.

NOPLE Who, Why, What, How and YOU! is disseminated throughout the community via:

a. Advertising and news releases to the local newspapers
b. Brochures distributed to the public at NOPLE entity offices
c. Frequently updated website
d. Regularly distributed Email newsletter
e. Delivery of Power Point presentations to community organizations and groups, and
f. Development of a working relationship between NOPLE and community groups and organizations.

Overall Approach to Guide Project Priorities

1. Based on the technical foundation and assessment of community interests, what actions, types of projects and areas are emphasized in your strategy?

The Strategy emphasizes identified actions in priority tiered watersheds with high likelihood of success and high benefit to salmon.

The Strategy, at pp 18-21 ("Project Sponsors Resources"), lists criteria and factors to be considered by project sponsors when developing proposals, including "tier justifications," "limiting factors" (or other written assessment), "recovery actions," and "feasibility based factors." The Strategy, at p 23 ("Table 3"), also refers project sponsors with technical questions to stakeholder leads, which are TRG members assigned to specific watersheds within their expertise.

2. How does your project ranking system support these priorities?

The NOPLE Project Ranking System is described in the NOPLE Score and Rank Merge Document.

After working with project sponsors and providing them with feedback throughout the preproposal process, each TRG member then scores and comments on each full proposal based on a detailed score sheet. Scores are based on the following criteria:

a. Priority Tier: 25%
b. Priority Activity: 20%
c. Benefit to Salmon: 30%
d. Certainty of Success: 25%.

The scores and comments are forwarded to both the LEG and the CFGs. The CFGs also score and comment on the projects within their WRIA area, with those scores and comments also forwarded to the LEG. The LEG then considers all the scores and comments in finalizing the prioritized list that is submitted to the SRFB.

In finalizing the prioritized list, the LEG generally adopts the scientifically-based ranked list produced through the TRG scoring process, unless community issues raised by the CFG(s) justify an adjustment. See the NOPLE Score and Rank Merge Document for more details.

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NOPLE Community Outreach Plan

Last updated July 12, 2004

Theme: "NOPLE Who, Why, What, How & You"

Goals

1) Educate general public (land-owners, residents) about salmon recovery efforts and opportunities to get involved.
2) Develop functioning NOPLE Citizen Facilitation Groups for EMMT, WRIA 19 and WRIA 20.
3) Ensure working relationships and information exchange between NOPLE and
   a) governmental agencies managing local public lands and natural resources
   b) local stewardship groups, land-owner associations, and special utility districts.
   c) local environmental, education, streamkeeper, and conservation entities
   d) local fishing, timber, and agricultural interests
   e) local economic development, business and commerce groups
4) Solicit letters of support for salmon habitat recovery strategy from groups identified above.
5) Identify potential partner opportunities.
6) Represent NOPLE at salmon recovery meetings and conferences at local, Puget Sound, State and Pacific NW level.

Audience

1) SRFB/WDFW: to see our entity at work
2) CFGs: to keep them up-to-date, to help them develop potential SRFB project proposals; and to obtain their input on NOPLE Strategy and grant proposals
3) Potential applicants: to keep them updated on available grants and relevant grant info
4) Landowners: to share info, resources, assistance
5) Residents: to let them know why and how to get involved in protecting and recovering salmon habitat
6) Entities & organizations: to educate on why and how to get involved in partnering with projects

Media

1) Website
2) Power point presentation to community groups
3) Brochure directing to website
4) Email newsletter directing to website
5) News releases and advertisings
6) Personal communications
7) On-site visits and meetings

North Olympic Peninsula
Project Strategy Acronyms

CFG	Citizen Facilitation Group
ESA	Endangered Species Act
LEG	Lead Entity Group
NOP	North Olympic Peninsula
NOPLE	North Olympic Peninsula Lead Entity
SASSI	Salmon and Steelhead Stock Inventory
SRFB	Salmon Recovery Funding Board
TRG	Technical Review Group
WDFW	Washington Department of Fish and Wildlife
WRIA	Watershed Resource Inventory Area

North Olympic Peninsula
Lead Entity
Salmon Habitat Recovery
2004 Project Strategy

Version 003.5

Project Strategy Objectives

Mission Statement

To develop a regional project strategy that when implemented will help to achieve genetically diverse, self-sustaining, salmon populations that will support healthy ecosystems and ceremonial, subsistence, recreational, and commercial fisheries.

Philosophy

The North Olympic Peninsula (NOP) is an exceptionally large and diverse region containing approximately 215 miles of marine shoreline and 90 independent watersheds flowing directly into the Pacific Ocean and Strait of Juan de Fuca. Within this region a multitude of salmonid stocks evolved. Today, the strength of these stocks ranges from strong to extremely weak. Our restoration strategy proposes to maintain or strengthen the strong stocks while restoring productive habitat for the weak stocks.

Following the Ice Age, many natural factors worked in concert to produce various levels of productivity within the watersheds and nearshore ecosystems on the NOP. Over the past 150 years, human impacts in the form of land use, harvest, and hatcheries, have significantly altered these natural factors to produce the lower productivity levels of today. To recover the productivity of these ecosystems we have, at our disposal, two primary tools in the form of protection and restoration actions. In some cases our knowledge of how to recover these ecosystems is hampered by a lack of knowledge, which requires the use of a third tool in the form of assessments and studies. Our success

in using these tools will be measured by the goals we choose for the NOP. These goals cannot be achieved without a strategic vision.

Our strategic vision emanates from the dilemma of which stocks to give highest priority for attention – the weak or the strong. The weakest stocks are seriously imperiled and may become extirpated unless habitat is restored immediately (e.g. Jimmy-Come-Lately summer chum). Weak stocks that were once highly productive, but have been seriously harmed by habitat degradation (e.g. Elwha chinook, pink, and chum), offer the greatest potential for providing regional increases in salmonid production. The strong stocks are important because they support fishing activities, contribute significantly to ecosystem processes, and serve as population centers that can over time repopulate depleted watersheds.

Focusing restoration and protection activities solely upon either weak or strong stocks will not likely restore healthy salmonid populations across this diverse region. A weak stock strategy of implementing habitat projects only where imperiled stocks will benefit would represent a political response to endangered species management in an effort to "de-list quickly" or reduce the presence of the federal government. Implementation of this strategy may result in "museum pieces" with small populations of unique stocks preserved over a wide geographic area. Although laudable from the standpoint of maintaining genetic diversity, this approach would probably fail in terms of overall salmon recovery. A strong stock strategy would maintain or strengthen strong stocks that could serve to repopulate depleted areas over time. This strategy holds some promise, although the relative isolation of the strong stocks would make the re-population of other areas a lengthy process. This approach also requires that severe habitat degradation will be addressed in watersheds currently without strong populations, or salmonid populations are not likely to rebuild on their own. Recent history shows that strong stocks are declining, and if this trend continues, those stocks may become weak. We have concluded that an overall recovery strategy that combines projects that: a.) maintain and improve habitat integrity so as to protect and strengthen wild stocks, and b.) restore habitat for the formerly productive but currently weak wild stocks, holds the most promise for salmon recovery on the NOP and probably elsewhere across the Pacific Northwest. The following goals embody the combined strategy.

Goals

The NOPLE Strategy is designed to:

- ✓ Maintain and improve ecosystem productivity and genetic diversity
- ✓ Protect highly productive habitats and populations and restore impaired habitat and populations with productive potential
- ✓ Utilize the best available science to set regional priorities
- ✓ Recognize socio-political factors in our decision making, and
- ✓ Provide direction and focus for our project sponsors.

Project Strategy Development Process and Methods

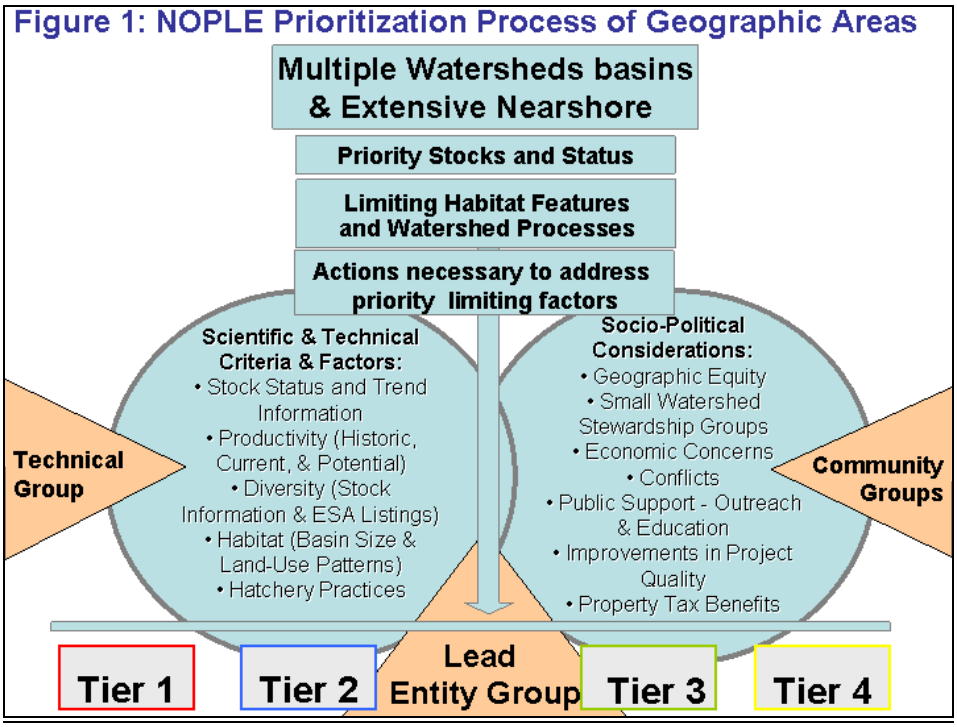
The NOP is one of the most diverse and complex lead entity regions within Washington State. The NOP region encompasses three full Watershed Resource Inventory Areas (WRIA 18, 19, and 20) and a portion of another (WRIA 17, Sequim Bay). In total, these WRIA's contain 90 independent watersheds, over 3,000 stream miles, and 215 linear miles of nearshore. Public lands within the NOP are managed by a variety of governments and government agencies, including the:

- Olympic National Park,
- Olympic Coast Marine Sanctuary,
- Olympic National Forest,
- US Fish and Wildlife Service,
- Jamestown S'Klallam Tribe
- Lower Elwha Klallam Tribe
- Makah Tribe
- Quileute Tribe
- Hoh Tribe
- Washington State Department of Natural Resources,
- Washington State Department of Fish and Wildlife,
- Washington State Parks and Recreation,
- Washington State Department of Transportation,
- Clallam and Jefferson Counties,
- Cities of Forks, Port Angeles, and Sequim, and the
- Port of Port Angeles.

Over the past 150 years, hatchery, harvest, agricultural and forestry practices, urbanization, dams (hydroelectric and diversion), and various port and shipping activities have impacted salmon and their habitat to varying degrees. As a result of these activities, four stocks on the NOP are currently listed as Threatened by the Endangered Species Act (ESA): Puget Sound chinook, Eastern Strait of Juan de Fuca – Hood Canal summer chum, Lake Ozette sockeye, and bull trout. The Washington State Salmon and Steelhead Stock Inventory (SASSI) also lists numerous stocks in each of the following categories: healthy, depressed, critical, or of unknown status. Diversity and complexity of this magnitude prompted us to design a comprehensive strategy that would allow us to better focus our project activities.

Our most significant challenge in developing a project strategy was to prioritize our region geographically, by placing watersheds and the nearshore into prioritized tiers, Tier 1 being of highest priority (Figure 1). To simplify the task, we first grouped like geographical units, where appropriate, and then defined the status and trend for each stock within those units. We then used a series of scientific/technical and socio-political criteria and factors (see below) to assign each of the geographical units into one of four tiers. Our Technical Review Group (TRG) applied scientific/technical criteria and factors

to each of the geographical units. The Lead Entity Group (LEG) of local governments and tribes, after considering comments and concerns from our four Citizen Facilitation Groups (CFG's), was responsible for applying socio-political criteria and factors. Our final task was to develop prioritized lists of activities and concepts for each geographical unit within the NOP which can be found in Appendix D. In lieu of completed lists for some of the geographical units, Appendix C provides for a Default Prioritization and Appendix E summaries of the major recommendations from the Limiting Factor Analyses were used to provide project focus.



Geographical Units

The NOP region was divided up into 24 geographical units (see map in Appendix F), as listed here from west to east:

- Hoh Basin
- Goodman Complex – including the Cedar, Goodman and Mosquito Creeks
- Quillayute Basin - including the Quillayute Mainstem, Calawah, Bogachiel, Sol Duc, and Dickey sub-basins
- Waatch Complex – including the Waatch River, Waatch Creek, Petroleum Creek, and Sooes River
- Ozette Basin
- Sekiu Basin
- Hoko Basin
- Clallam Basin
- Pysht Basin

- East & West Twin basins
- Lyre Basin
- Salt Basin
- Western Strait Clallam Independents – all independent drainages between Village and Colville creeks, not otherwise listed here.
- Elwha Basin
- Urban Independents – including Peabody, Tumwater, Dry, and Lees creeks unless listed separately
- Valley Basin
- Ennis Basin
- Morse Basin
- Central Strait Clallam Independents – including Bagley, Siebert, and McDonald creeks
- Dungeness Basin
- Eastern Strait Clallam Independents – including Bell, Gierin, Cassalery, Cooper, and Meadowbrook creeks. Note: Meadowbrook is treated here as an independent drainage.
- Jimmy-Come-Lately Basin
- Sequim Bay basins – including Dean, Johnson, and Chicken Coop creeks
- NOP Nearshore – Hoh River north to Cape Flattery east to Sequim Bay

  Note: To facilitate better communication, joint planning, and ultimately, we hope, higher potential success of salmon recovery, the NOP and the Hood Canal Coordinating Council (HCCC) lead entities worked collaboratively to develop a shared framework for the nearshore (available on request). Treatment of all of the nearshore as a single geographic unit within this project strategy is consistent with the methods used to classify watersheds within the NOP and HCCC. We recognize that within this single geographic unit, there is a diversity of nearshore ecosystems, but from the perspective of salmon these ecosystems are all ecologically connected. In the next generation of this project strategy, however, the North Olympic Peninsula Lead Entity (NOPLE) shall consider dividing the nearshore into 3 separate geographical units for socio-political purposes, the NOP Pacific Nearshore, NOP Strait Nearshore, and the Port Angeles Harbor Nearshore. The scientific and technical bases for such a division shall also be considered.

Stock Status and Trends

Our project strategy, in large part, is stock based. Recognizing that stock information from SASSI and the Limiting Factors Analyses is either outdated or incomplete for our purposes, the TRG updated and added to that information as an aid in developing the NOPLE Strategy. Our NOP Watershed Data Matrix (Appendix A) includes the most current stock status information for each geographical unit, and also information on extirpated stocks, the existence of strays, population trends (i.e., increasing, decreasing,

or stable), and hatchery activity. Updated stock information within the NOP Watershed Data Matrix was used, in large part, to assign qualitative measures to many of the Technical and Scientific Criteria and Factors discussed below.

Scientific and Technical Criteria and Factors

Geographical units were assigned to tiers using a series of scientific and technical criteria and factors, many of which were scaled qualitatively from high to low (Appendix B). These criteria and factors included:

Productivity Criteria – Productivity criteria were the initial and primary criteria used to assign each geographical unit to a particular tier.

1. Historic Productivity – a qualitative term that is based on the TRG's collective knowledge of the historical biological and physical characteristics of the geographical unit. Characteristics considered included yield / unit area (smolt production) and the hydrology, geology, geomorphology, and geography of the unit. Each geographical unit was initially assigned to a tier using this criterion.
2. Current Productivity – a qualitative term, relative to Historic Productivity, that's based on the known biological and physical condition of the geographical unit. Characteristics considered included yield / unit area (smolt production) and the current condition of habitat with respect to the hydrology, geology, geomorphology, and geography of the unit. This criterion was used to further justify the initial tier assignments that were based on historic productivity levels.
3. Potential Productivity – a factor used to further justify the tier assignment of a geographical unit that was historically highly productive, but now requires large scale restoration efforts to achieve recovery. This criterion, while not scaled from high to low, was used to further justify the initial tier assignments that were based on historic productivity levels.

Diversity Criteria – Diversity criteria provided either additional justification for the initial tier assignments or reasoning to move the geographical unit to a different tier.

4. Number of Historical Populations – used as one indicator of historic diversity.
5. ESA Threatened Listings – a listing under the ESA; four stocks are listed as Threatened on the NOP. This criterion was used as one indicator of impacts to historic diversity.
6. Number of Critical & Extirpated Stocks – the total number of critical and extirpated stocks within each geographical unit, enumerated from our Watershed Data Matrix. Extirpated stocks are those that are at risk of becoming functionally extinct. This criterion was also used as an indicator of the impacts to historic diversity.

Habitat Criteria – Habitat criteria, in the form of basin size and land use patterns, provided either additional justification for the initial tier assignments or reasoning to move the geographical unit to a different tier.

7. Basin Size – square miles of drainage area within a geographical unit. Basin size was not used as a criterion in and of itself, rather, it was used in conjunction with other criteria when assigning qualitative measures (*i.e.*, from high to low), primarily because smaller basins can be as highly productive as larger basins.
8. Land Use Patterns – the extent by which infrastructure limits our ability to conduct restoration and protection activities.

Hatchery – Hatchery impacts primarily provided justification to move geographical units to lower tiers.

9. Current Hatchery Activity Impacts - including out-plants from hatchery facilities, and whether those activities are for production purposes or for the recovery of wild stocks. This criterion includes the effects of "incidental mortality" on wild fish during the harvest of hatchery fish.

<u>Socio-Political Considerations</u>

Our project strategy can not be successful without considering the various socio-political aspects of salmon recovery. Some examples of the socio-political aspects of salmon recovery include, but are not limited to:

- Development of small watershed / nearshore stewardship groups,
- Consideration for various economic concerns, for example, economic livelihood, regulatory changes, and USFS funding levels,
- Effectiveness of land use regulation and enforcement (*e.g.*, Growth Management Act, Critical Areas Code, Shorelines Management Act, Forest Practices Act, etc.),
- Assurance of equity between Tribal U & A's, WRIA's, watershed basins, & nearshore areas,
- Consideration that salmon recovery is sometimes in conflict with governments, agencies, organizations, and citizens – including landowner concerns, development, harvesting natural resources (fishing, mining, timber, etc.), transportation, dams, water diversions, and allocations,
- Determination and rallying of overall public support,
- Providing outreach & education information to the public, including the full range of growth impacts on salmon recovery choices,
- Encouraging the development of better projects from Project Sponsors, and
- Consideration of property tax benefits for allowing recovery activities on land (*e.g.*, conservation easements and restoration activities).

Our tiered list of geographical units was altered, where appropriate, when various socio-political aspects of salmon recovery were considered.

Prioritized Lists of Activities and Concepts

Prioritized lists of activities and concepts, where complete, were developed by the Stakeholders for each geographical unit. Stakeholders, as defined by our LEG, are those that have a direct interest or responsibility in a watershed or nearshore area. They include landowners, fish interest organizations, governments, co-managers (tribes and Washington Department of Fish and Wildlife (WDFW)), individual fish experts, and project sponsors. Stakeholders were provided three opportunities to participate in the development of the lists, including:

- Direct involvement by proactively contacting the appropriate Stakeholder Lead for the geographical unit. A Stakeholder Lead acts as a focal point for involvement of Stakeholders in the development and prioritization of the lists.
- Submission of Project Ideas for a geographical unit(s), and
- Review of the draft lists contained within this document.

In lieu of completed lists for some of the geographical units, a summary of the major recommendations from the Limiting Factor Analyses were used to provide project focus.

Results and Conclusions

General Tier Guidelines

Geographical Units were assigned to tiers by sequentially applying each of the scientific and technical criteria and factors and the socio-political considerations using a set of very general tier guidelines (Table 1). Coarse-scale tier assignment criteria, which were considered to be more tier specific, were applied initially. Current and Potential Productivity criteria were primarily used to maintain the balance in emphasis on both strong and weak stocks, particularly in Tier 1. Fine-scale tier assignment criteria, while not tier specific, were applied to make appropriate adjustments to the initial tier assignments.

Table 1. Project Strategy Development Criteria -- General Tier Guidelines

Project Strategy Development Criteria (Revised 10AUG01)	Definitions	General Tier Guidelines			
		Tier 1	Tier 2	Tier 3	Tier 4
Coarse-Scale Tier Assignment Criteria					
Basin Area	**Square miles of drainage area within the geographical unit.**	100+	10 to 100	10 to 100	< 10
Historic Productivity	**A qualitative term that's based on historical knowledge of biological and physical characteristics of the geographical unit. (H = High Productivity, L = Low Productivity)**	MH+	M+	ML+	ML
Current Productivity	**A qualitative term, relative to historic productivity, that's based on the known biological and physical condition of the geographical unit. (H = High Productivity, L = Low Productivity) This criterion was used to further justify the initial tier assignments that were based on historic productivity levels.**	M+ (Strong-Weak Balance)	ML+ (Strong-Weak Balance)	ML+ (Strong-Weak Balance)	L (Strong-Weak Balance)
Potential Productivity	**A factor used to further justify the tier assignment of a geographical unit that was historically highly productive, but now requires large scale restoration efforts to achieve recovery. This criterion was used to further justify the initial tier assignments that were based on historic productivity levels.**	Not Scaled (Strong-Weak Balance)	Not Scaled (Strong-Weak Balance)	Not Scaled (Strong-Weak Balance)	Not Scaled (Strong-Weak Balance)
No. of Populations on a Historic Basis [1]	**Total of all entries in "Status" column, excluding "Strays", for each watershed.**	6+	3 TO 5	3 TO 5	3 TO 5
No. of ESA Listed Stocks [2]	**Number of stocks listed as Threatened or Endangered by the Endangered Species Act**	1+	0	0	0
No. of known Critical and Extirpated Stocks [2]	**Total of all Critical and Extirpated entries in the "Status" column for each watershed.**	3+	0 TO 2	0 TO 2	0 TO 2
Fine-Scale Tier Assignment Criteria					
Landuse	**Extent to which infrastructure limits our ability to do restoration and/or protection activities? (H = No Limitations, L = Major Limitations)**	Not Tier Specific	Not Tier Specific	Not Tier Specific	Not Tier Specific
Hatchery Activity Impacts	**Impacts from hatchery activities, including out-plants from hatchery facilities, on wild stocks. Hatchery activities are conducted for either production purposes or to recover wild stocks. This criterion includes the effects of "incidental mortality" on wild fish during the harvest of hatchery fish.**	Not Tier Specific	Not Tier Specific	Not Tier Specific	Not Tier Specific
Socio-Political Considerations	**See the Project Strategy Development Process and Methods section for a list of Socio-Political Considerations applied to the tiered geographical units by the North Olympic Peninsula Lead Entity Group**	Not Tier Specific	Not Tier Specific	Not Tier Specific	Not Tier Specific

[1] Indicator of Historic Diversity

[2] Indicator of impacts to Historic Diversity

Note: Qualitative scale assignments: H = High, MH = Medium High, M = Medium, ML = Medium Low, L = Low

Tiered Geographical Units

Tier 1

Thirteen geographical units were assigned to Tier 1 and are listed below, alphabetically:

- Dungeness Basin
- Elwha Basin
- Hoh Basin
- Hoko Basin
- Crescent-Lyre Basin
- Morse Basin
- Nearshore
- Ozette Basin
- Quillayute Mainstem
- Dickey Basin
- SolDuc Basin
- Bogachiel Basin
- Calawah Basin

Productivity

Historically, the basins of the Dungeness, Elwha, Lyre, Morse, Ozette, the Dickey and the Sol Duc were highly productive (*i.e.*, relative productivity level of 5 or 4 with 5 being the highest) (Figure 2). The basins of the Dungeness, Elwha, Ozette, and the Quillayute are also among the largest basins within the NOP; hence, total productive output was invariably high (Figure 3). While the Crescent-Lyre and Morse basins are smaller than others within Tier 1, historically they were considered to be highly productive. Declines in productivity to current levels within the Crescent-Lyre, Dickey, and Sol Duc were smaller relative to other basins. These relatively smaller declines in productivity provide justification for their Tier 1 assignment. Historic productivity levels within the Hoh Basin were lower than other basins within the tier, however, an ESA listing of Threatened for bull trout and the relatively large drainage area warranted a Tier 1 assignment. Similarly, historic productivity levels within the Bogachiel and Calawah were lower than other basins within the tier; however, their proximity to the Quillayute mainstem and large drainage areas warranted a Tier 1 assignment.

The Dungeness, Elwha, Morse, and Ozette basins have experienced significant decreases in stock productivity levels, (i.e., in the Dungeness and Ozette from 5 to 2 and Elwha and Morse from 5 to 1). There are numerous arguments for what has caused these decreases, ranging from impacts to habitat, harvest activity, and changes in the oceanic environment. Our efforts should focus on returning these and all Tier 1 systems to stable, highly productive, and diverse producers of fish.

While the effort to restore and improve stocks in the Dungeness, Elwha, Morse, and Ozette basins will be expensive, the productivity potential of these basins warrants such efforts. These large restoration efforts include dam removal, property acquisition, dike setback, elimination of reed canary grass, and large wood supplementation. We believe that the Dungeness, Elwha, Morse, and Ozette basins must have a well-designed "Watershed Recovery Strategy" that includes the sequencing of all restoration activities within each of the basins. A "Watershed Recovery Strategy" will also help us understand the scale of the effort required to "fix" these basins.

It's difficult to compare productivity levels in the nearshore with those found in basins through any quantitative means. On a relative scale, however, the nearshore as a whole was believed to be highly productive and that an assignment to Tier 1 seemed appropriate at this time. Current productivity levels in the nearshore are unknown but are suspected to be declining.

Diversity & Stock Issues

Most of the Tier 1 geographical units historically contained larger numbers of individual stocks than those units in other tiers (Table 2), one indicator of historic diversity. The basins of the Dungeness, Elwha, Hoh, Morse, Ozette, the Quillayute mainstem, Sol Duc, and the Bogachiel each contained 7 or more individual populations. The Crescent-Lyre and Hoko basin, while having fewer populations historically, were placed within Tier 1 for other reasons. The Crescent-Lyre and Hoko Basins were placed within Tier 1, not only for high historic productivity levels, but also to protect the unique genetic diversity of the stocks, particularly the severely declining fall chum and western strait chinook populations, respectively.

Negative impacts to habitat over the past 150 years were responsible, in part, for the decline of many stocks within the Tier 1 geographical units. Today, stocks within the basins of the Dungeness, Elwha, Hoh, Morse, Ozette, and in the upper Sol Duc (*e.g.*, bull trout) within the Quillayute Basin are now listed as Threatened under ESA, an indicator of current diversity conditions. Numerous stocks (13 in total) within these same basins, many of which are not listed by ESA, are also considered either critical or extirpated by SASSI and the NOP TRG (Table 2); another indicator of current diversity conditions. A total of 9 stocks in the Dungeness, Elwha, and Ozette basins and two in the Hoh Basin are also declining.

The nearshore area, estuaries in particular, is critical to juvenile Pacific salmon for feeding, rearing, and migrating. Juvenile chum and chinook salmon, in particular, are recognized as being fundamentally dependent on nearshore ecosystems. This fact is of heightened significance to the NOP (and HCCC), given that ESA-listed Hood Canal / Eastern Strait of Juan de Fuca summer chum salmon and Puget Sound chinook salmon occur throughout many of our nearshore ecosystems. Chinook and chum stocks, in the western Strait of Juan de Fuca, while not currently listed by ESA, are considered to be at critical or depressed levels. However, the importance of the nearshore is not restricted to chum and chinook salmon alone. All salmon must migrate through the nearshore, both as

juveniles heading to sea and as adults returning to spawn. Hence, the nearshore within the salmon recovery jurisdiction of the NOP (and HCCC) supports multiple species and stocks of Pacific salmon that originate not only from watersheds within this geographic unit, but also from outside this area. The nearshore is increasingly being recognized as a critical, year-round component of Pacific salmon life histories, hence, further warranting a Tier 1 assignment. We also know that the nearshore supports the life history of forage fish species, crustaceans, and macro-invertebrates, which are critical prey for Pacific salmon. Detailed information on the nearshore can be found in the NOP and HCCC Shared Framework.

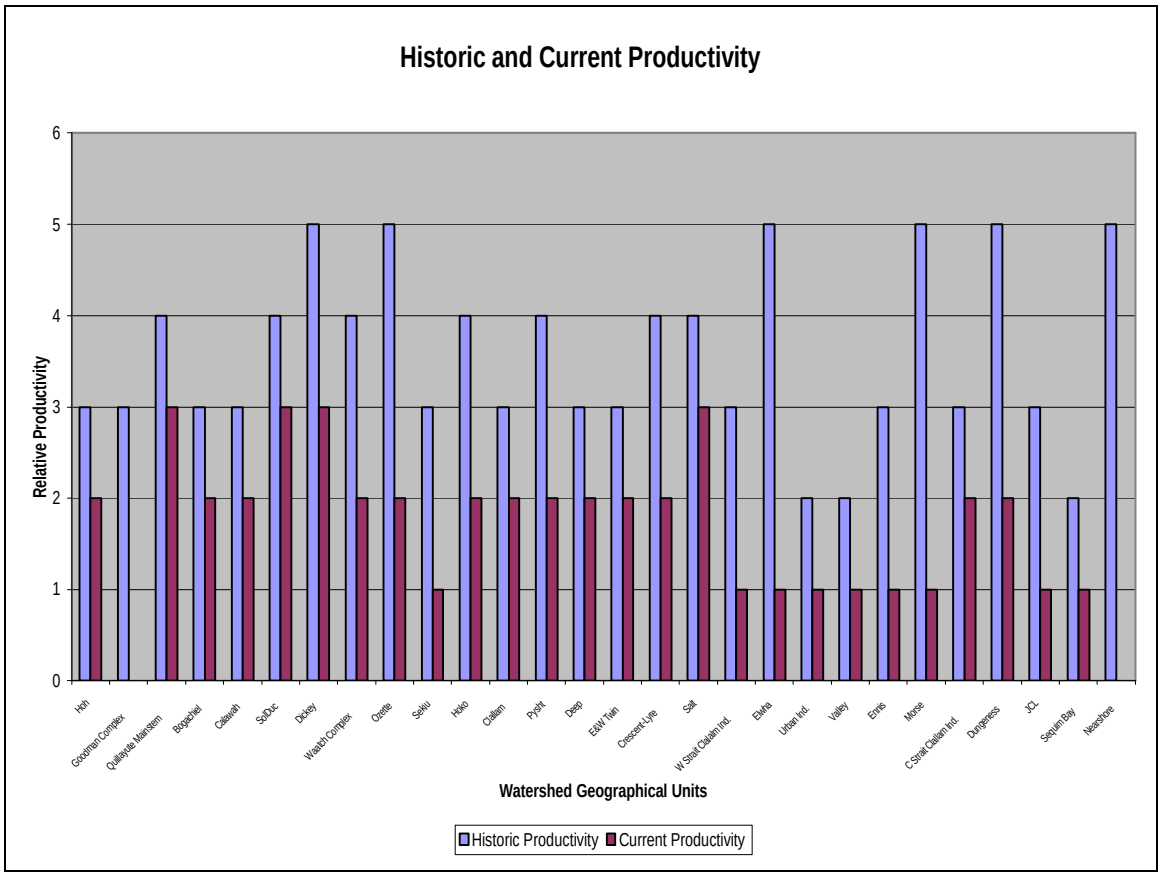


Figure 2: Historic and current productivity levels for each geographical unit on a qualitative scale, 5 = High Productivity and 1 = Low Productivity.

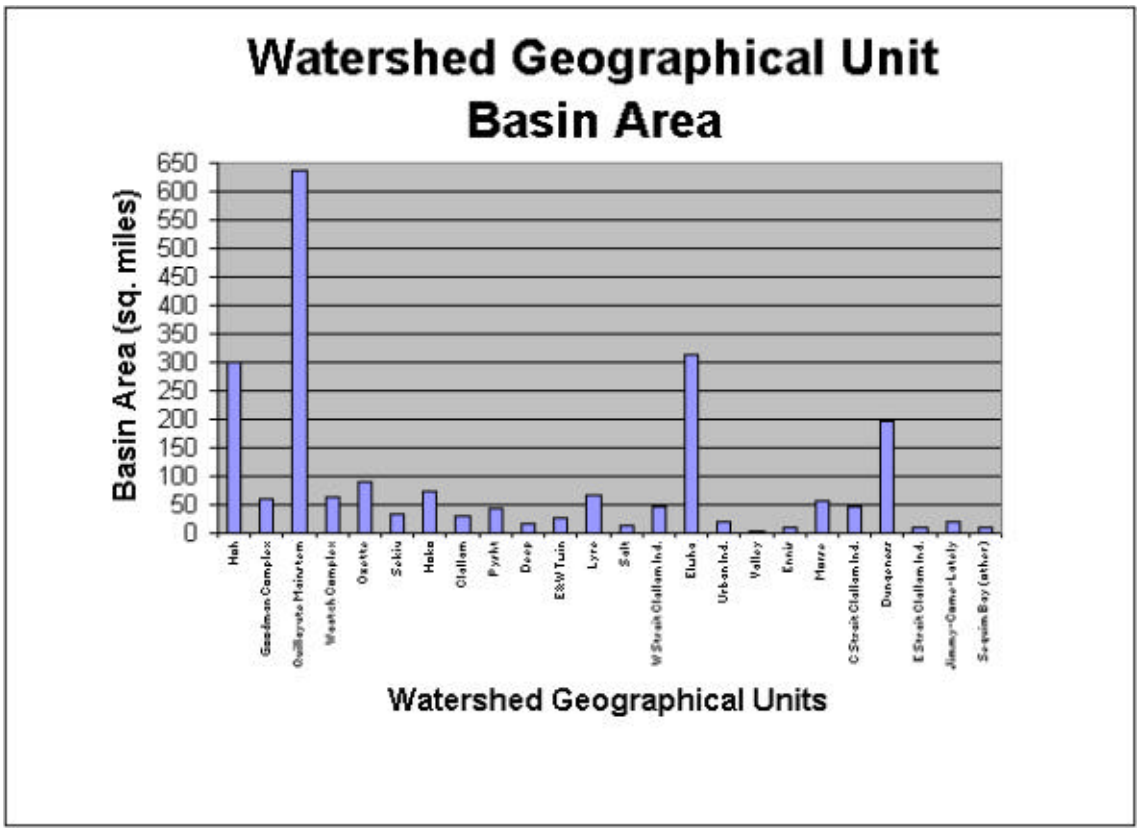


Figure 3: Basin area in square miles for each watershed geographical unit.

Table 2. North Olympic Peninsula stock status and trends summary

Geographical Unit (Revised 15June03)	No. of Stocks or Stock Compnent on a Historic Basis	Stocks Listed as ESA Threatened	Breakdown of Critical and Extirpated Stocks (updated by NOP TRG)		Total No. of *Known* Critical and Extirpated Stocks	Current *Known* Trends as per NOP TRG		Total No. of *Known* Declining Stocks	Specific Stocks at Risk of Extirpation as per NOP TRG
			Crit.	Ext.		Healthy or Depressed but Declining	Critical and Declining		
Central Strait Clallam Independents (McDonald, Siebert, & Bagley [1])	4			fall chum	1	fall coho, winter steelhead		2	coho
Clallam Basin	4		fall chum		1			0	chum
Deep Basin	4		fall chum		1		fall chum	1	chum
Dungeness Basin	11	PS chinook, ESJF&HC summer chum, bull trout	spring/summer chinook, fall pink, summer steelhead		3		fall pink, summer steelhead	2	
E & W Twin Basins	4		fall chum		1	fall coho, winter steelhead	fall chum	3	chum
Eastern Strait Clallam Independents (Bell, Gierin, Cassalery, Cooper, Meadowbrook)[1]	4				0			0	coho
Elwha Basin	10	PS chinook, bull trout	summer pink, fall chum	spring/summer chinook	3	summer/fall chinook,bull trout	summer pink, fall chum	4	
Ennis Basin [3]	3			fall chum	1	fall coho		1	
Goodman Complex (Cedar, Goodman, Mosquito)	4		Unknown	Unknown	Unknown			0	
Hoh Basin	8	bull trout			0	spring/summer chinook, fall chinook		2	
Hoko Basin	5		fall chum		1			0	chum
Jimmy-Come-Lately	4	ESJF&HC summer chum	summer chum		1		summer chum	1	chum, coho
Lyre-Crescent Basin	5		fall coho		1	fall chum		1	chum
Morse Basin	8	PS chinook, bull trout	fall coho, summer pink, fall chum	spring/summer chinook	4			0	
Nearshore [3]	124+	4	24+	7+	31+	16+	11+	27+	See basins
Ozette Basin	7	sockeye	fall chinook, fall chum, sockeye		3		fall chum	1	
Pysht Basin	5		summer/fall chinook		1	fall chum		1	chinook
Quillayute Mainstem	11	bull trout[2]	summer chinook		1	fall coho, winter steelhead		2	
Dickey	4							0	
Solduc	9	bull trout						0	
Bogachiel	7							0	
Calawah	6		summer chinook		1			0	
Salt Basin	4				0			0	
Sekiu Basin	5		summer/fall chinook,fall chum		2			0	chinook, chum
Sequim Bay (Johnson, Chicken Coop, Dean) [3]	3				0	fall coho		1	
Urban Independents (Lees, Peabody, Tumwater, & Dry)[1]	4			fall coho(?), fall chum, winter steelhead(?)	3	fall coho(?), winter steelhead(?)		2	
Valley Basin [3]	4			fall coho, fall chum, winter steelhead	3			0	
Waatch Complex (Waatch, Waatch Cr., Petroleum, Sooes)	5		chum		1		chum	1	
Western Strait Clallam Independents (Village east to Colville Creek)[1]	4		fall coho, fall chum		2		fall coho, fall chum	2	coho, chum

[1] Excluding basins that are treated separately.
[2] Bulltrout are listed in the upper Sol Duc.
[3] Requires confirmation by full TRG

Tier 2

Seven geographical units were assigned to Tier 2 and are listed below, alphabetically:

- Clallam Basin
- Deep Basin
- East and West Twins
- Jimmy-Come-Lately Basin
- Pysht Basin
- Salt
- Sekiu

Productivity

Historically, the Pysht and Salt basins were considered to have moderately high productivity levels (Figure 2), higher than the majority of the geographical units assigned to Tier 3. While the current productivity level in the Pysht basin has declined, the NOP TRG considers this basin to have the "best hope" of recovery for western Strait chinook and chum within WRIA 19 due to lower impact land-use practices. Western Strait chinook and chum are currently considered to be at great risk of extirpation by the NOP TRG (Table 2).

Lower historic productivity levels within the E & W Twin, Sekiu, Clallam and Deep basins did not warrant a lower Tier assignment, primarily due to the fact that the potential for the successful restoration of these basins is thought to be high.

Diversity and Stock Issues

Jimmy-Come-Lately Creek is the primary watershed of concern within Sequim Bay. This geographical unit was placed within Tier 2 due to concerns that summer chum and coho are at great risk of extirpation (Table 2). Summer chum is also listed as Threatened under the ESA.

Tier 3

Seven geographical units were assigned to Tier 3 and are listed below, alphabetically:

- Eastern Strait Clallam Independents
- Central Strait Clallam Independents
- Ennis Creek
- Goodman Complex
- Valley Basin
- Waatch Complex
- Western Strait Clallam Independents

Productivity

In general, historic productivity levels of basins assigned to Tier 3 were lower than in Tier 1 or 2. Five of the Seven geographical units within Tier 3 were classified as having medium (level 3) historic productivity levels (Figure 2). These basins are Ennis Creek, the Goodman Complex, Western Strait Clallam Independents, Central Strait Clallam Independents, and Eastern Strait Clallam Independents. Negative impacts on habitat have caused less severe declines in productivity levels within these basins then in some of the larger geographical units within Tier 1. The Waatch Complex, while historically of medium-high productivity level, was placed into Tier 3 because of the overwhelming influence of hatchery out-plants on wild stocks for production purposes within this basin.

Diversity and Stock Issues

The total number of historic populations within the geographical units assigned to Tier 3 was lower, generally, than those in Tier 1 or 2 (Table 2). Four populations were present within each of the basins of the Eastern Strait Clallam Independents, Central Strait Clallam Independents, Goodman Complex, Valley Basin and the Western Strait Clallam Independents. Five populations were present within the Waatch Complex. No ESA listed stocks are present within the geographical units assigned to Tier 3. The total number of known critical and extirpated stocks and those that are at risk of extirpation was not enough to warrant a higher tier assignment for these basins.

Socio-Political Considerations

The Valley and Ennis Basins, while small drainages relative to others within the tier and ones that have been severely impacted by poor land use practices, were moved from Tier 4 to Tier 3 because of the tremendous community involvement and support for the restoration of these basins.

Tier 4

One geographical unit was assigned to Tier 4 and is listed below:

- Urban Independents

Productivity

The small drainage areas and heavily degraded conditions of these mostly urban basins did not warrant a higher tier assignment at this time.

Diversity and Stock Issues

Historically, four populations were present within these basins (Table1). Previous land use practices are primarily responsible for the extirpation of three of these populations.

Future Tier Assignments - NOP Project Strategy: Version 004

In the next version of our project strategy, (*i.e.*, NOPLE Strategy: Version 004), NOPLE will consider splitting up the following multi-watershed geographical units into individual basins and assigning them to appropriate tiers:

- Eastern Strait Clallam Independents
- Central Strait Clallam Independents
- Goodman Complex
- Sequim Bay
- Waatch Complex
- Western Strait Clallam Independents
- Urban Independents

The next Strategy version will also include a prioritization on a reach-level scale of all Tier 1 and Tier 2 watersheds and the nearshore.

Prioritized Lists of Activities and Concepts: Criteria and Factors to Consider

Stakeholders and Stakeholder Leads - Prioritized lists of activities and concepts, where complete, were developed by the Stakeholders and Stakeholder Leads, for several geographical unit or sub-units (Appendix D). Stakeholders and Stakeholder Leads (Table 3) were encouraged to use some or all of the following criteria information and factors to develop and prioritize their lists. Each group of Stakeholders, however, may have applied these criteria and factors differently and, as they deemed appropriate.
In lieu of completed lists for most of the geographical units (or sub-units), NOPLE refers to Appendix C of the Strategy, at p 27 ("Default Prioritization for Watersheds without Prioritized Lists"), which outlines the hierarchical restoration actions strategy developed by Roni et. al. 2002 as a guide in determining the priority of the various types of actions, as well as the major recommendations from the Limiting Factor Analyses, Watershed Analyses, or more recent assessments. Appendix E contains a summary of the major recommendations from the Limiting Factor Analyses for the WRIA's 18, 19, and 20 in the NOP Region.

Project Sponsors - Project Sponsors must consider these criteria and factors when developing projects from the various Prioritized Lists of Activities and Concepts or from the Limiting Factor Analyses recommendations; Watershed Analyses, or more recent assessments, if prioritized lists are not available. Appendix E contains a summary of the major recommendations from the Limiting Factor Analyses for the WRIA's 18, 19, and 20 in the NOP Region.

When considering the Recovery Actions as noted below, Project Sponsors must state the type of action (i.e., Protection, Restoration, or Assessment) they are undertaking and reference the source of the idea (published document, assessment, etc.).

- *Tier Justification Information* – contained within this document.

- *Limiting Factor Information* - Prioritized Lists of Activities and Concepts, under development by Stakeholders and Stakeholder Leads for each geographical unit (or sub-unit), must be designed to maintain or improve habitat-forming processes. Human alterations of various habitat-forming processes are often represented in the literature as limiting factors. Limiting factor information for the NOP is contained, primarily, within the following documents produced by the Washington State Conservation Commission or the Summer Chum Conservation Plan for the NOP region:

    - Summer Chum Conservation Plan: An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region, 2000
    - Salmon and Steelhead Habitat Limiting Factors: Watershed Resource Inventory Area 18, 1999
    - Salmon and Steelhead Habitat Limiting Factors in the Western Strait of Juan de Fuca (WRIA 19), 1999
    - Salmon and Steelhead Habitat Limiting Factors in the North Washington Coastal Streams of WRIA 20, 2000

  Other important limiting factor references are also available for many of the basins on the NOP, most notably Watershed Analyses. It's important to note here that the Limiting Factors Analyses published by the Conservation Commission, incorporated information from Watershed Analyses and other assessments. Stakeholders and Project Sponsors should refer to these other assessments, if the Limiting Factor Analyses are deemed inadequate or incomplete in any way, although it is recognized that such incorporations of necessity were abbreviated or in some cases omitted maps or other specifics.

- *Recovery Actions* – Stakeholders and Stakeholder Leads should explain why each type of recovery action (i.e., protection, restoration, or assessments) was included within the Prioritized List of Activities and Concepts for each geographical unit. [Project Sponsors must identify and adequately explain

why a certain type of action is being taken when proposing a project.] Each explanation should include the appropriate citations or documented evidence (i.e., Limiting Factor Analyses, Watershed Analyses, or other assessments) as to the need for a particular recovery action within a geographical unit. The primary types of recovery actions include:

- *Protective Actions* – Protection by means of acquisition, and education, or by means of restoration when the problem will not self-correct in a reasonable time. Acquisition includes the purchase of land, access, or utilization of rights in fee title or by perpetual easement.

- *Restorative Actions* – Restoration in the form of "on the ground" work such as:

    - ❖ In-stream passage - includes those items that affect or provide fish migration up and downstream to include road crossings (bridges and culverts), barriers (dams, log jams), fishways, (ladders, chutes, pools), and log and rock weirs.
    - ❖ In-stream diversions – includes those items that affect or provide for the withdrawal and return of surface water to include the screening of fish from the actual water diversion (dam, headgate), the water conveyance system (both gravity and pressurized pump), and the by pass of fish back to the stream.
    - ❖ In-stream habitat – includes those freshwater items that affect or enhance fish habitat below the ordinary high water mark of the water body. Items include work conducted on or next to the channel, bed, bank, and floodplain by adding or removing rocks, gravel, concrete, or woody debris. Other items necessary to complete the project may include livestock fencing, water conveyance, and plant removal and control.
    - ❖ Riparian habitat – includes those freshwater, marine nearshore, and estuarine items that affect or will improve the riparian habitat outside of the ordinary high water mark or in wetlands. Items may include plant establishment / removal / management, and livestock fencing, stream crossing, and water supply.
    - ❖ Upland habitat – includes those items or land use activities that affect water quality and quantity important to fish, but occur above the riparian or estuarine area. Items include the timing and delivery of water to the stream; sediment and water temperature control; plant removal, control, and management; and livestock fencing and water supply.
    - ❖ Estuarine/Marine Nearshore – includes those items that affect or enhance fish habitat below the ordinary high water mark of

the water body. Items include work conducted in or adjacent to the intertidal area and in subtidal areas. Items may include beach restoration, bulkhead removal, dike breaching, plant establishment/removal/management, ghost net removal, and tide channel reconstruction.

- ❖ Assessment Actions – may include feasibility studies; channel migration studies; reach-level, nearshore, and estuarine assessments; and inventories such as barriers, unscreened water diversions, and landslide hazards. A feasibility could include assessing the willingness of landowners to allow access to their land for a habitat development project or to consider selling a conservation easement. The results of proposed assessments must directly lead to identification, siting, or design of habitat protection or restoration projects. Assessments intended for research purposes, monitoring, or to further general knowledge and understanding of watershed conditions and function, although important, are not eligible for Salmon Recovery Funding Board (SRFB) funding. Assessments must be closely coordinated with other assessments and data collection efforts in the watershed and with Washington State Departments of Ecology, Fish and Wildlife, and Conservation Commission, and Tribes to prevent duplication and to ensure the use of appropriate methods and protocols. To improve coordination, lead entities are encouraged to be applicants for these funds or to partner with applicants. Assessments and studies must be completed within two years, unless, additional time can be justified by the project sponsor.

- ➢ *Current Hatchery Information* – Current hatchery and out-plant activity information, and whether those activities are for the purpose of production or the recovery of wild stocks, must be considered by Stakeholders and Stakeholder Leads when developing and prioritizing lists of activities and concepts for each geographical unit (Table 4). Projects developed from the prioritized lists by Project Sponsors must directly benefit wild fish. The NOP TRG will carefully evaluate projects, in this regard, during the application review process. For the next Strategy version, we will consider adding a table to the NOPLE Strategy that reflects historical or cumulative hatchery impacts.

- ➢ *Ecological and Species Life History Factors:*

    - Proximity to Productive Stocks and Priority Watersheds - What is the proximity of the nearshore habitat to productive stocks and priority watersheds? (Refer to the tiered watershed priorities for guidance.) *

- Support Migrating Stocks – Does this activity and concept support stocks or populations from outside of the area that potentially utilize our extensive nearshore as migratory corridors? *
- Ecological Connectivity – Will this activity and concept improve ecological connectivity (*i.e.*, biological, chemical, and physical) within the ecosystem?
- Scale – Is the benefit (*i.e.*, spatial, temporal, and biological) of the activity and concept appropriate for the degree of impairment to the habitat structure or ecological processes or functions? Biological scale includes stocks, populations, life histories, components, etc.
- Human Induced Threats – Does the activity and concept address the threats to the habitat structure, ecological process or functions?
- Natural Threats – Does this activity and concept interrupt the natural ecological processes or functions? What are the natural vulnerability or risks, associated with the habitat structure or ecological processes or functions in need of protection and restoration, including risks inherent with low population numbers?
- Appropriate Time Frame – Does the project address the cause of the problem within an appropriate time frame?

* Used for the evaluation of nearshore activities and concepts only.

➢ Feasibility Based Factors:

- Technical Feasibility – Is the activity and concept technically feasible?
- Certainty of Success - What is the certainty of success associated with the activity and concept?
- Appropriate Project Costs – Are the project costs appropriate for the activity and concept?
- Opportunity – Will the opportunity be lost if we don't act now?

  Note: Project opportunities must also be addressed at the final stage of each funding cycle, *i.e.* by the LEG at the time when NOP project lists are approved for submission to funding organizations. This concept should <u>not</u> be considered during the project application review and scoring process.

Table 3. North Olympic Peninsula Stakeholder Leads

Geographical Unit or Sub-Unit (Revised 07June03)	Stakeholder Leads	Phone No.	Email
Bogachiel	Frank Geyer	360.374.2027	fgeyer@olypen.com
Quillayute Mainstem	Frank Geyer	360.374.2027	fgeyer@olypen.com
Calawah	Frank Geyer	360.374.2027	fgeyer@olypen.com
Cedar/Goodman/Mosquito	Jim Jorgensen	360.374.6548	jjsalmo@hotmail.com
Clallam	Mike McHenry, Pat Crain	MM: 360.457.4012.x14; PC: 360.417.2423	mchenry@elwha.nsn.us; pcrain@co.clallam.wa.us
Deep	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Dickey	Frank Geyer	360.374.2027	fgeyer@olypen.com
Dungeness	Byron Rot	360.681.4615	brot@jamestowntribe.org
E&W Twin	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Elwha	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Eastern Strait	Walt Blendermann	360.683.0676	tunamann@hotmail.com
Hoh	Jim Jorgensen	360.374.6548	jjsalmo@hotmail.com
Hoko	Jeff Shellberg	360.645.3175	jshellbe@centurytel.net
Jimmy-Come-Lately	Byron Rot	360.681.4615	brot@jamestowntribe.org
Sequim Bay	Byron Rot	360.681.4615	brot@jamestowntribe.org
Crescent-Lyre	TBD		
Morse	Randy Johnson	360.417.3301	johnsraj@dfw.wa.gov
Central Strait	Dave Shreffler Byron Rot	DS: 360.582.1712 BR: 360.681.4615	DS: lostmtnloft@olympus.net BR: brot@jamestowntribe.org
Ennis	TBD		
Ozette	Jeff Shellberg	360.645.3175	jshellbe@centurytel.net
Nearshore	TBD		
Urban Independents	TBD		
Pysht	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Salt	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Sekiu	Jeff Shellberg	360.645.3175	jshellbe@centurytel.net
Sol Duc	Frank Geyer	360.374.2027	fgeyer@olypen.com
Valley	Cathy Lear	360.417.2361	clear@co.clallam.wa.us
Western Strait Clallam Independents [1]	Mike McHenry	360.457.4012.x14	mchenry@elwha.nsn.us
Waatch/Waatch Cr./Petroleum/Sooes	Jeff Shellberg	360.645.3175	jshellbe@centurytel.net

[1] Excluding the watersheds that are treated separately within this table.
TBD = To be determined.

Table 4. North Olympic Peninsula Lead Entity Current Hatchery Information

Hatchery Information Revised 07June03 Table 4		Hoh	Goodman Complex	Calawah	Bogachiel	Sol Duc	Dickey	Waatch Complex	Ozette	Sekiu	Hoko	Clallam	Pysht	E&W Twin	Deep	Lyre	Salt	W. Strait Clallam Ind.	Elwha	Urban Inpendents	Valley	Ennis	Morse	C. Strait Clallam Ind.	Dungeness	E. Strait Clallam Ind.	Jimmy-Come-Lately	Sequim Bay (other)
Species	**Type**																											
Tier		1	3	1	1	1	1	3	1	2	1	2	2	2	2	1	2	3	1	4	3	3	1	3	1	3	2	3
Chinook	Spring/Summer				HR																				HR			
	Summer/Fall										HR								HP									
	Spring					HP																						
	Summer																											
	Fall							OP																				
Coho	Unspecified							OP																				
	Fall					HP													HP						HP			
	Summer					HP																						
	Winter																											
Pink	Unspecified																											
	Summer																											
	Fall																								HR			
Chum	Unspecified																											
	Summer																										HR	
	Fall																											
	Winter																		HR									
Sockeye									HR																			
Bull Trout																												
Steelhead	Unspecified																											
	Winter	OP	OP	HP	HP	OP		OP		OP	HP	OP	OP	OP ?		OP	OP	OH	HP &O				OP		HP			
	Summer			HP	HP	OP										OP			O[1] P									
Cutthroat	Unspecified																											
	Coastal																											
Kokanee																												

H = Hatchery Facility
O = Outplants from Hatchery

P = Production Hatchery
R = Recovery Hatchery

NW = No Wild Fish (all hatchery fish)
[1] OUTPLANT ACTIVITY WAS DISCONTINUED IN THE YEAR 2000.

Project Strategy Development Data (Revised 07JUN03)		Hoh		Cedar/ Goodman/ Mosquito		Quillayute Mainstem		Calawah		Bogachiel		Sol Duc		Dickey		Waatch/ Waatch Cr./ Petroleum/ Sooes		Ozette		Sekiu		Hoko		Clallam		Pysht		E&W Twin	
Species	**Type**	**Status**	**Trend**	**Status**	**Trend**			**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**
Chinook	Spring/Summer	H	DEC							U HR																			
	Summer/Fall																			C 3	STA	D HR	INC	S		C 3	STA		
	Spring					NW HP		U				NW HP																	
	Summer					H	STA	C	STA	H	STA	U																	
	Fall	H	DEC	U		H	STA	H	STA	H	STA	H	STA	H	STA	H OP	STA	C	U										
Coho	Unspecified															H OP	STA												
	Fall	H	STA	H	U	H	STA	H	INC	H	STA	H HP	STA	H	STA			D (2p's) 2	INC	D	STA	D	INC	D	INC	D	INC	D	DEC
	Summer					H HP	STA					H HP	STA																
	Winter																												
Pink	Unspecified	S				S				S		S																	
	Summer																												
	Fall																					S				S			
Chum	Unspecified	U				S				U		S		S		C	DEC												
	Summer																												
	Fall			S														C 2	DEC	C	STA	C	U	D	STA	D	DEC	C	DEC
Sockeye		S						S		S		H	STA			S		C 2 HR	STA	S		S							
Bull Trout		U				U		U		U		U	C	U															
Steelhead	Unspecified					H	STA																						
	Winter	H OP	STA	U OP		U		H HP	STA	H HP	STA	H OP	STA	H	STA	H OP	STA	D	STA	D OP	STA	H HP	STA	D OP	U	H OP	STA	D	DEC
	Summer	U						U HP		U HP		U OP										S							
Cutthroat	Unspecified															D	UNK	U		U		D	U	U		U			
	Coastal	H	UNK	H	U	H	STA	H	STA	U		H	U	H	STA			H	U									U	
Kokanee																		U (2p's) 2											

[1] - North Coastal Miscellaneous Independents (management purposes)
[2] - Distinct Ozette populations
(2p's) - Two different phenotypes in Ozette
[3] - Western Strait of Juan de Fuca groups but different populations
[4] O. mykiss beardslee (lake only)
[5] O.clarkii crescenti (lake only)
[6] Marine Fish - Releases from stms w barriers

H = Healthy E = Extirpated
D = Depressed S = Strays
C = Critical U = Unknown
NW = No Wild Fish (all hatchery fish)

STA = Population is **STA**ble
DEC = Population is **DEC**lining
INC = Population is **INC**reasing

H = Hatchery Facility
O = Outplants from Hatchery
P = Production Hatchery
R = Recovery Hatchery

- revisions made April 3, 2003

Appendix A
Watershed Data Matrix

Deep		Lyre		Salt		Western Strait Clallam Independents (Colville to Village)		Elwha		Urban Independents (Peabody, Valley, Tumwater, Dry, & Lees)		Valley		Ennis		Morse		Central Strait Clallam Independents (McDonald, Siebert, Bagley)		Dungeness		Eastern Strait Clallam Independents (Bell, Gierin, Cass., Cooper, Mead)		Jimmy-Come-Lately		Sequim Bay (Johnson, Dean, Chicken Coop)	
Status	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**	**Status**	**Trend**
								C	**STA**							**U**				C [HR]	STA						
								D [HR]	DEC																		
		S				S																					
D	INC	C	STA	H	STA	C	DEC	H [HP]	STA	D/E	DEC					C	STA	D	DEC	H [HP]	STA	**C**	**DEC**	D	STAB		
																				U							
								C	DEC							C	STA			D	STA						
																				C [HR]	DEC						
																				C/S				C [HR]	DEC		
C	DEC	D	DEC	U		C	DEC	**C** [HR]	STA/INC	E						C	STA	E		D	STA	U	Meadobrook				
S		S						U												S							
								H [7]	**STA** [7]							U		S		H	?	S					
		Crescent [4]																									
INC	STA	U [OP]		H	STA	D [6]	U	H [HP]	STA	D/E	DEC					D [OP]	STA	D	DEC	D [HP]	?	U	Bell	U			
		C [OP]						U [OP]								U				C	DEC						
		Crescent [5]						U										U				D	STA	U			
U		U		D	U	U				U						U				U							
		Crescent						H	STA																		

[1] - North Coastal Miscellaneous Independents (management purposes)???

[2] - Distinct Ozette populations

[(2p's)] - Two different phenotypes in Ozette

[3] - Western Strait of Juan de Fuca groups but different populations

[4] O. mykiss beardslee (lake only)

[5] O.clarkii crescenti (lake only)

[6] Marine Fish - Releases from strms w barriers

[7] Above the dams

H = Healthy
D = Depressed
C = Critical
E = Extirpated
S = Strays
U = Unknown
NW = No Wild Fish (all hatchery fish)

STA = Population is **STA**ble
DEC = Population is **DEC**lining
INC = Population is **INC**reasing

[H] = Hatchery Facility
[O] = Outplants from Hatchery
[P] = Production Hatchery
[R] = Recovery Hatchery

Appendix B
Project Strategy Development Data

Project Strategy Development Data (Revised Fall 2003)	Definitions	Hoh	Goodman Complex	Quillayute Mainstem [3]	Calawah	Bogachiel	Sol Duc	Dickey	Waatch Complex	Ozette	Sekiu	Hoko	Clallam	Pysht	E&W Twin
	Tiers	1	3	1	1	1	1	1	3	1	2	1	2	2	2
Historic Productivity	A qualitative term that's based on historical knowledge of biological and physical characteristics of the geographical unit. (H = High Productivity, L = Low Productivity)	M	M	MH	M	M	MH	H	MH	H	ML	MH	M	MH	ML
Current Productivity	A qualitative term, relative to historic productivity, that's based on the known biological and physical condition of the geographical unit. (H = High Productivity, L = Low Productivity)	ML	U	M	ML	ML	M	M	ML	ML	L	ML	ML	ML	L
No. of Populations on a Historic Basis [1]	Total of all entries in "Status" column, excluding "Strays", for each watershed.	8	4	11	6	7	9	4	5	7	5	5	4 OR 5	5	4
No. of ESA Listed Stocks	Number of stocks listed as Threatened or Endangered by the Endangered Species Act	1	0	1	0	0	1	0	0	1	0	0	0	0	0
No. of known Critical and Extirpated Stocks	Total of all Critical and Extirpated entries in the "Status" column for each watershed.	0	U	1	1	0	0	0	1	3	2	1	1	1	1
Basin Area	Total square miles of drainage area within the geographical unit.	299	61.1	7.2	133	162	226	108	62.6	88.4	33	72	31.6	44.4	26.8
Landuse	Extent to which infrastructure limits our ability to do restoration and/or protection activities? (H = No Limitations, L = Major Limitations)	ML	MH	M	MH	M	ML	M	MH	M	M	M	M	M	MH

Project Strategy Development Data (Revised Fall 2003)	Deep	Lyre	Salt	Western Strait Clallam Independents	Elwha [2]	Urban Indpendents	Valley [3]	Ennis [3]	Morse	Central Strait Clallam Indpendents	Dungeness	Eastern Strait Clallam Inpendents	Jimmy-Come-Lately	Sequim Bay (other) [3]
Tiers	2	1	2	3	1	4	3	3	1	3	1	3	2	3
Historic Productivity	M	MH	MH	M	H	ML	ML	M	H	M	H	M	M	ML
Current Productivity	ML	ML	M	L	L	L	L	L	L	ML	ML	L	L	L
No. of Populations on a Historic Basis [1]	4	5	4	4	10	4	4	3	8	4	11	4	4	3
No. of ESA Listed Stocks	0	0	0	0	2	0	0	0	2	0	3	0	1	0
No. of known Critical and Extirpated Stocks	1	1	0	2	3	3	3	1	4	1	3	0	1	0
Basin Area	17.3	66.1	12	48.3	313	18.9	4.2	10.6	58.2	47.3	198	10.9	19	11.6
Landuse	H	M	M	ML	H [2] / ML	L	L	ML	L	M	ML	ML	ML	ML

[1] Indicator of Historic Diversity
[2] With implementation of EEFRA
[3] Requires confirmation by entire TRG

Note: Qualitative scale assignments: H = High, MH = Medium High, M = Medium, ML = Medium Low, L = Low

Appendix C. Default Prioritization for Watersheds without Prioritized Lists

Most streams and rivers in the NOPLE area do not have prioritized lists, and many have a limiting-factors analysis that is incomplete or overly general. To help applicants choose appropriate projects in these watersheds and to help TRG, LEG and CFG members rank these projects, NOPLE has chosen Roni et al. (2002)[1] as its default prioritization strategy. Roni et al. (2002) is a review of the literature on the effectiveness of salmon restoration projects. It is designed to be "a first step in assisting with prioritizing site-specific restoration activities and for providing guidance for allocating monies spent on [the] restoration of Pacific Northwest watersheds inhabited by anadromous salmonids." The review found that "watershed restoration should focus on restoring natural processes that create and maintain habitat rather than manipulating instream habitat." Based on that philosophy, the authors suggest that restoration efforts are usually most effective if they adhere to the following hierarchical strategy:

1. **Analyze the site**: The first step is an analysis of the watershed or project site. The analysis should identify both healthy and degraded habitat based on the natural characteristics of the site. If degraded habitat is found, determine what habitat-forming processes specific to that site are altered and the factors responsible.
2. **Protect the best**: The most effective step after the analysis is to protect salmonid habitat that is already healthy.
3. **Reconnect healthy habitat**: The next most effective action is to reconnect healthy but isolated habitat. Examples include removing culvert barriers and reconnecting the stream or river to sloughs, wetlands, blind channels or estuarine habitat.
4. **Fix bad roads**: Road repair is high on the list because failing and poorly designed roads hurt salmonid habitat in many ways. Roads can increase delivery of fine sediment that chokes spawning beds. Culverts can change stream hydrology or block the transport of sediment, wood and nutrients. Road-related landslides can increase bedload supply, filling rearing pools and decreasing stream stability.
5. **Restore riparian processes**: Damage to the riparian zone includes any alteration that disrupts its natural interaction with the stream, river or wetlands. Examples include: timber harvest; conversion of riparian zones from conifers to hardwoods, which can reduce the long-term supply of LWD; and livestock grazing in riparian corridors, which can cause streambank erosion, channel sedimentation and widening and decreased water quality.
6. **Restore instream habitat**: Instream habitat restoration (adding LWD, boulders, spawning gravel and nutrients) is last because it tends to be a temporary fix and because results are variable. Roni et al. (2002) found that most instream structures last less than 20 years (Ehlers 1956; House 1996), which means they require regular replacement unless habitat-forming processes outside of the stream are restored.

It should again be noted that this list is intended to guide prospective project sponsors to identify projects that will be highly likely to provide meaningful benefit to salmon within watersheds that do not already have prioritized projects lists or strategies. However, it is not intended that this list dictate the type of projects that are proposed for these watersheds. To the extent that information exists to suggest that any of the identified project types will have a high benefit to salmon (based on project scope, scale, location, etc.), the use of that information is encouraged in order to bring forward the best projects possible for a given watershed. Conversely, a high priority project type may not be applicable within a given basin, and so may not actually provide the high benefit to salmon suggested by the default list. For example, a culvert replacement project that only provides access to a limited amount of high quality habitat will not have the same benefit to salmon as an extensive project that restores riparian processes of a significant portion of a watershed. In all cases, it is the responsibility of the project applicant to justify the project selected, and carefully describe the anticipated benefits to salmon, particularly in answering the "Fit to Strategy Questions" that must be submitted with the SRFB/NOPLE Full Applications.

[1] Philip Roni, Timothy Beechie, Robert Bilby, Frank Leonetti, Michael Pollock and George Pess. A Review of Stream Restoration Techniques and a Hierarchical Strategy for Prioritizing Restoration in Pacific Northwest Watersheds. *North American Journal of Fisheries Management* 22:1-20, 2002.

Appendix D

North Olympic Peninsula Lead Entity

Completed Prioritized Lists of Activities and Concepts

Dungeness Basin
Goodman Complex
Hoh Basin
Nearshore [1]
Quillayute Basin

[1] Prioritization of the NOPLE List of Activities and Concepts for the Nearshore will be completed for the next Strategy version.

Dungeness River Management Team
Basic Criteria for Project Prioritization
on the
Dungeness River

Members of the Dungeness River Management Team (DRMT) ranked each Strategic Element by scoring the Potential (Project) Activities within each element using four basic criteria. All of the Strategic Elements and Potential (Project) Activities were developed from the Recommended Restoration Projects for the Dungeness River (1997) and the Salmon and Steelhead Habitat Limiting Factors for WRIA 18 (2000). The reader should refer to Appendix E in this NOPLE Strategy for a list of the major habitat limiting factors in the Dungeness River.

These criteria used by the DRMT to prioritize the Strategic Elements and Potential (Project) Activities are listed below:

- Status / Urgency:

  I = Immediate - ready to proceed if funding becomes available
  P = Phased - requiring prior steps to proceed
  A = Active Analysis – in the process of study, design, or planning
  D = Discussion – under preliminary discussion

- Promotes Ecosystem Function: High, Medium or Low

- Benefit to Salmon [1]

- Certainty of Success [1]

[1] As defined by the SRFB Technical Panel for the most current grant cycle

A summary of the scores is included within the Prioritized List of Activities and Concepts for the Dungeness River.

Dungeness River Management Team. Project Prioritization Results. April 19, 2001

Strategic Element in Ranking Order (1 = highest priority)	Potential Activities	Individual Scores 0 (lowest) - 10 (highest) or NS (no score)											Score Total	# of Scores in Average	Score Average	Rank (1 = highest priority)
1. Restoration of Lower River Floodplain and Delta	a. Land Acquisition	10	4	10	10	10	10	10	10	10	10	10	104.0	11	9.455	1
	b. Schoolhouse Bridge Expansior	9	3	10	10	10	9.6	9	9	10	7	10	96.6	11	8.782	2
	c. Dike Removal / Setback	9	5	10	10	10	10	8	9	10	4	10	95.0	11	8.636	3
2. Protection of Existing Functional Habitat	a. Land Acquisition	10	6	8	8	9	7.6	10	9	8	6	10	91.6	11	8.327	4
3. Floodplain Restoration / Constriction Abatement (RM 2.6 - 10)	a. Land Acquisition	9	7	7	9	8	7.7	10	8	9	5	10	89.7	11	8.155	5
	b. Bridge Analysis and Possible Expansion	5	2	5	6	9	8	8	7	9	5	10	74.0	11	6.727	24
	c. Dike / Road Removal / Setback	6	6	8	8	9	7.6	8	8	9	5	10	84.6	11	7.691	9
4. Water Conservation / Instream Flow Protection / Water Quality	a. Piping / Lining / Other Conservation Plan Strategies	8	7	9	9	7	6	10	7	6	10	10	89.0	11	8.091	6
	b. Re-regulating Reservoir Project	6	6	8	9	7	6	7	8	6	9	10	82.0	11	7.455	10
	c. Acquisition of Water Rights (seasonal or long term) by Ecology	5	10	10	8	7	4	5	7	6	8	9	79.0	11	7.182	14
	d. Irrigation-related Water Quality Improvements	5	5	9	8	6	2	7	6	6	6	7	67.0	11	6.091	29
	e. Monitoring Projects	7	6	7	10	7	6.5	6	4	6	3	8	70.5	11	6.409	27
	f. Remove /Reduce Use of Small Streams for Irrigation Conveyance	5	9	6	7	3	7.5	8	9	6	8	6	74.5	11	6.773	23
5. Restoration of Functional Riparian and Riverine	a. Fall Pink Spawning Channel - Lower Corps Dike Area	7	6	10	9	7	2	8	6	5	4	10	74.0	11	6.727	24
	b. Lower Matriotti Creek	4	7	10	8	6	NS	8	7	5	9	8	72.0	10	7.200	13
	c. Small Creeks	4	7	10	8	6	3.5	7	7	5	9	7	73.5	11	6.682	26
	d. Side Channel Construction / Restoration	6	5	10	9	7	3.5	7	8	5	7	10	77.5	11	7.045	17
	e. Revegetation Activities	6	6	NS	8	8	5	10	9	5	6	7	70.0	10	7.000	18
6. LWD Placement	a. Railroad Bridge	8	4	9	10	8	7	10	7	4	8	10	85.0	11	7.727	8
	b. Small LWD Projects to Enhance / Protect Side Channel Habitat	8	10	9	9	8	6	10	6	4	7	10	87.0	11	7.909	7
	c. Log Jam Inventory - Small Streams	3	8	9	8	7	4	NS	4	4	5	8	60.0	10	6.000	30
	d. LWD Supply, Storage, and Coordination on North Olympic Peninsula	6	10	10	9	7	7.5	10	1	4	7	8	79.5	11	7.227	12
	e. Monitoring Projects	7	8	5	10	6	5	7	4	4	2	10	68.0	11	6.182	28

Strategic Element in Ranking Order (1 = highest priority)	Potential Activities	Individual Scores 0 (lowest) - 10 (highest) or NS (no score)											Score Total	# of Scores in Average	Score Average	Rank (1 = highest priority)
7. Nearshore Habitat	a. Graysmarsh Restoration	5	1	7	9	10	10	6	8	5	6	10	77.0	11	7.000	18
	b. Forage Fish Inventory	3	2	9	8	5	3	7	3	5	2	8	55.0	11	5.000	37
	c. Small Estuaries	NS	3	7	7	10	8	8	6	5	6	8	68.0	10	6.800	22
8. Barrier Removal	a. Canyon Creek Dam	6	3	8	7	8	6	7	10	4	8	8	75.0	11	6.818	21
	b. Irrigation Outtakes	NS	4	NS	8	3	1	8	9	4	6	8	51.0	9	5.667	32
	c. Inventory and Assessment of Additional Barriers	4	5	0	7	6	2	9	7	4	4	8	56.0	11	5.091	36
9. Stock Recovery / Rehabilitation	a. Chinook Captive Broodstock Program	8	9	10	9	6	8	10	1	4	5	10	80.0	11	7.273	11
	b. Pink Broodstock Program	7	9	10	9	6	8	10	1	4	4	10	78.0	11	7.091	15
	c. Chinook and Pink Life History Analysis	7	8	0	6	2	7.5	7	1	4	8	9	59.5	11	5.409	33
	d. Dungeness Bull Trout Life History Analysis	5	7	0	6	2	7	7	1	4	8	7	54.0	11	4.909	38
	e. Winter / Summer Steelhead Rehab	NS	8	8	8	4	NS	7	1	4	4	8	52.0	9	5.778	31
	f. Small Streams / Coho Rehab	NS	7	5	8	4	4	7	5	4	4	6	54.0	10	5.400	34
10. Sediment Management / Source Control	a. Analysis of Potential Commercial Forest harvest	3	8	3	7	1	1	8	1	7	4	7	50.0	11	4.545	39
	b. Soils Analysis - Upper Watershed	5	8	0	7	1	2.5	8	1	7	2	7	48.5	11	4.409	40
	c. Sediment Transport Analysis (Lower River)	5	9	0	8	2	2.5	7	2	7	6	8	56.5	11	5.136	35
	d. Road Decommissioning and Maintenance	7	8	10	8	8	4	10	2	7	4	10	78.0	11	7.091	15
	e. Gold / Silver Creek Slide Remediation	NS	7	10	NS	8	3	10	2	7	6	10	63.0	9	7.000	18

Goodman Complex Project Prioritization Strategy

Goodman Creek, Mosquito Creek, Cedar Creek and Steamboat Creek

Protect the Best/Restore the Rest!!!

Three general categories of recovery activities are identified for the Goodman, Mosquito, Cedar and Steamboat Creek Independent Watershed Strategies to Protect and Restore Wild Stocks and their Habitat Productivity. 1) The First is Protection of Habitat and Habitat Forming Processes that contribute significantly to the overall salmonid ecology through regulation of potentially impacting human land-use and resource extraction activities and implementation of actions to protect normally functioning areas from the progression of impacts from adjacent areas. This category could also include education, of landowners and the general public regarding stewardship and the purchase of conservation easements or land where significantly impacting activities are still permitted, or are otherwise expected to occur. 2) The Second is Collection of information where data gaps exist within areas of significant fish use and land-use activity or resource extraction. 3) The Third is the Conduct of restoration projects to reinstate or advance the recovery of habitat, habitat protection processes and habitat formation processes that affect the salmonid ecology. The effects of past and future land-use regulation on recovery under present, expected and desired future conditions will be evaluated in conjunction to any additional recovery and restoration activities considered. The regulations, which are still in flux, include the Jefferson County Unified Development Code (Jeff. C. UDC), addressing non-forest lands and forestland conversions, and the Forest Practices Act (FPA) covering private and state forest lands. Other complementary forest practices regulations include the Washington Department of Natural Resources Habitat Conservation Plan (WDNR-HCP) covering state management of state and county forest trust lands. The WDNR-HCP implementation plan is still under development. The Forest Practice Act is currently under revision to address existing and potential ESA salmonid listings in a negotiated framework agreed to by the timber industry, state and federal fishery agencies.

Significant impacts to salmonid ecology are expected to have resulted from existing riparian infrastructure (roads, revetments, culverts, etc.) to impede normal habitat, riparian and channel function. Protection of such structures from channel cutting under emergency activities and regulations is expected to be less of an impact in these drainages with some exception for Highway 101 crossing near the mouths of Cedar and Steamboat Creeks. Limited circumstances for emergency protections may exist for the Goodman Mainline logging road crossing the lower third of Goodman and Mosquito Creeks. Other smaller parallel roads and structures may create a greater obstacle to cumulative recovery in these independent drainages.

The TRG initially recommended the Goodman and other nearby ocean Independents for Tier 3 Protection Activities. These aggregated drainages were placed within the third level category for protection because the largest (Goodman = 44 square miles) has three stocks of wild salmon and steelhead and down to the smallest, Steamboat Creek (4 square miles) which is known to contain coho and presumed to contain wild winter steelhead. The salmon would contribute to the long-term maintenance of ocean fishery catch levels while recreational stream fisheries routinely take coho and steelhead. These drainages occur within Washington Treaty Tribal Fishing Usual and Accustomed Areas (U & A's) covered under the Treaty of Olympia, 1865 and affirmed under U.S. vs. Washington, 1974. Historically, the stranded crew of the St. Nicholas, a Russian ship which ran aground near the mouth of the Quillayute River, 1807, and the Tribes, in U.S. vs. Washington, 1974, documented an established Indian lodge and fishing site on Goodman Creek. The Russians observed coho salmon stored there.

The TRG's Tier 3 prioritization recognizes this lower diversity of stocks, the overall historic versus current and future potential productivity, and the expected continuation of a strictly forestry land-use and FPA and WDNR-HCP regulation for these areas.

Priorities for the above Activities are recommended. Their separation is recommended by Tributary attributes and tributary size. Examples follow based on the combined rationale:

Priority 1—Goodman Creek Protection—(38 square miles)-North of Hoh River and Mosquito Creek

Protection of the greatest number of salmonid stocks, among these independents, anadromous and non-anadromous is identified for Goodman Creek. This priority fits with the current mosaic of exclusive forest and Olympic National Park land-use on coastal topography that is semi-rugged but not as extreme and Olympic Mountain topography. Significant instability is expected to be a significant factor in this semi-rugged topography because of the evidence unstable banked soils and underlying clay observed in adjacent areas of the Lower Hoh River basin. High levels of sediment impact channel substrate in these independent tributaries, argued as to its relationship to human activities. Protection would include any project, which protected full function of floodplain and channel-migration, first bench wetland and refugia habitat and its connectivity, adjacent riparian areas, and adjacent bank and immediate adjacent valley-wall stability. These processes affect the habitat that these species would be expected to use during one or more of their life history stages including seeking refuge from extreme flows. This priority would also include any assessment or restoration activities associated with attaining such protection or advancing the associated recovery time.

Prioritization among multiple potential projects within Goodman Creek should give priority to furthest upstream reaches for protection first except where opportunities, timeliness and the willingness of landowner or other cooperators dictates. Two rationale are utilized to set these priorities; 1) The process of physical channel and habitat recovery is assumed to have its greatest chance of success if the furthest upstream and upslope

reaches are stabilized first. The slope instability (human induced and natural) and surface soil erosion potential generally increases further up the watershed as gradient increases. It is assumed that the attainment of desired future riparian stand conditions upstream, also that corresponding to any of the significant WDNR ownership, can provide functional size wood for habitat and channel stability earlier to the comparatively narrower upstream channels thus curtailing their destabilizing impact to the larger channels downstream. It is also assumed that surface erosion issues must be dealt with on steeper slopes and roads first. This priority also assumes an advantage from earlier curtailment of harvest (assumed) on state lands. Other factors that could affect the usefulness of the criteria are specific ownership and regulatory patterns, current road and revetment location and windthrow patterns. 2) The greatest benefit to all stocks is assumed to occur if the progeny of the earliest upstream fish enter and can obtain lengthened rearing times in expanded upstream areas of recovered habitat during their freshwater rearing stages.

Uppermost stream reaches include approximately 15% of the basin under private industrial forest ownership and regulated under the state Forest Practice Act (FPA-new rules under development), the next downstream areas representing approximately 50% of the basin under state trust ownership. State trust lands are managed by the WDNR and regulated under their Habitat Conservation Plan (HCP). Below state trust lands are approximately another 20% of the basin under private industrial ownership. On the lowest part of the drainage ONP ownership comprises approximately 15% of the basin, including the confluence of tributaries and a remote and unique canyon estuary. The most stringent protections are expected to continue within this remote ONP ownership and then come into play in the future under management of WDNR-HCP lands. Less stringent protections are expected to come into play on private industrial land later as their harvest was the most recent activity (need to check on this). Near term conditions on most Private and WDNR managed lands resulting from recent harvest under old rules will be continued losses of certain functions. Eventual reversal of that trend of loss in function will then be followed by a gradual increase of those functions only after certain desired future conditions can be met.

In some situations this recovery may be enhanced or advanced through the development of protection or restoration projects where future conditions and functions could be assured long-term or through restoration projects where such conditions or functions can be advanced in time. In the meantime certain assessments would need to be accomplished in order to make informed decisions on limiting factors and current conditions in this comparatively unstudied stream.

Priority 2 – Mosquito and Cedar Creek Protection (21 & 16 square miles respectively) - Mosquito is adjacent and north of the Hoh River. Cedar is adjacent and south of the Hoh River

Protection of a lower number of salmonid stocks per independent drainage for anadromous and non-anadromous fish is identified for these streams. This priority fits with the current mosaic of exclusive forest and Olympic National Park land-use on

coastal topography that is semi-rugged but not as extreme and Olympic Mountain topography.

Significant instability is expected to be a factor in this semi-rugged topography because of the evidence of unstable bank soils and underlying clay observed in adjacent areas of the Lower Hoh River basin. Significant impacts from sedimentation are clearly evident in the substrate of these streams. One tributary of Cedar Creek is named Sand Creek. The contribution of human activity to this heavy substrate sedimentation has been under debate. Protection would include any project, which protected full function of floodplain and channel-migration, first bench wetland and refugia habitat and its connectivity, adjacent riparian areas, and adjacent bank and immediate adjacent valley-wall stability. These processes affect the habitat that these species would be expected to use during one or more of their life history stages including seeking refuge from extreme flows. This priority would also include any assessment or restoration activities associated with attaining such protection or advancing the associated recovery time.

Prioritization among multiple potential projects within Mosquito and Cedar Creeks should give priority to furthest upstream reaches for protection first except where opportunities, timeliness and the willingness of landowner or other cooperators dictates. Two rationale are utilized to set these priorities; 1) The process of physical channel and habitat recovery is assumed to have its greatest chance of success if the furthest upstream and upslope reaches are stabilized first. The slope instability (human induced and natural) and surface soil erosion potential generally increases further up the watershed as gradient increases. It is assumed that the attainment of desired future riparian stand conditions upstream can provide functional size wood for habitat and channel stability earlier to the comparatively narrower upstream channels thus curtailing their destabilizing impact to the larger channels downstream. It is anticipated that recovery can begin in larger areas of Cedar Creek than Mosquito Creek first where a higher proportion of state managed land exists. Projects, which benefit from earlier and greater attainment of desired future conditions should receive priority here. This will also be a function current road and revetment location, windthrow, future forestry regulation under continuing land-use patterns reflective of the land-use distribution. 2) The greatest benefit to all stocks is assumed to occur if the progeny of the earliest upstream fish enter and can obtain lengthened rearing times in expanded upstream areas of recovered habitat during their freshwater rearing stages.

Practically all stream reaches above the ONP strip on Mosquito Creek are in industrial timberlands. Approximately 50% of the area above the ONP strip on Cedar Creek consist of WNDR managed lands near the top of the drainage, 30% in industrial timberland and 10% in small private non-forest parcels just above the ONP strip. Projects should be assessed with highest priority for projects that remove impediments to recovery, then those which advance recovery.
Priority should be given to activities that directly complement timely attainment of desired future conditions and processes. In another words projects should assure attainment and perpetual maintenance of desired future conditions in the most advanced

recovery areas first, or, in the case of a restoration project, bridge any gap until natural processes can maintain the function that was installed.

Priority 3 – Steamboat Creek Protection (4 square miles) – south of and adjacent to Cedar Creek.

Protection of a lower number of salmonid stocks per independent drainage for anadromous and non-anadromous fish is identified for these streams. This priority fits with the current mosaic of exclusive forest and Olympic National Park land-use on coastal topography that is semi-rugged but not as extreme and Olympic Mountain topography.

Significant instability is expected to be a factor in this semi-rugged topography because of the evidence of unstable bank soils and underlying clay observed in adjacent areas of the Lower Hoh River basin. Significant impacts from sedimentation are clearly evident in the substrate of this stream. The contribution of human activities to this heavy substrate sedimentation has been under debate. Protection would include any project, which protected full function of floodplain and channel-migration, first bench wetland and refugia habitat and its connectivity, adjacent riparian areas, and adjacent bank and immediate adjacent valley-wall stability. These processes affect the habitat that these species would be expected to use during one or more of their life history stages including seeking refuge from extreme flows. This priority would also include any assessment or restoration activities associated with attaining such protection or advancing the associated recovery time.

Prioritization among multiple potential projects within Steamboat Creek should give priority to furthest upstream reaches for protection first except where opportunities, timeliness and the willingness of landowner or other cooperators dictates. Two rationale are utilized to set these priorities; 1) The process of physical channel and habitat recovery is assumed to have its greatest chance of success if the furthest upstream and upslope reaches are stabilized first. The slope instability (human induced and natural) and surface soil erosion potential generally increases further up the watershed as gradient increases. It is assumed that the attainment of desired future riparian stand conditions upstream can provide functional size wood for habitat and channel stability earlier to the comparatively narrower upstream channels thus curtailing their destabilizing impact to the larger channels downstream. Projects, which benefit from earlier and greater attainment of desired future conditions, should receive priority here. This will also be a function current road and revetment location, windthrow, future forestry regulation under continuing land-use patterns reflective of the land-use distribution. 2) The greatest benefit to all stocks is assumed to occur if the progeny of the earliest upstream fish enter and can obtain lengthened rearing times in expanded upstream areas of recovered habitat during their freshwater rearing stages.

Practically all reaches above the ONP strip on Steamboat Creek are in industrial timberlands. Approximately 50% of the area above the ONP strip on Cedar Creek consist of WNDR managed lands near the top of the drainage, 30% in industrial

timberland and 10% in small private non-forest parcels just above the ONP strip.
Projects should be assessed with highest priority for projects that remove impediments to recovery, then those which advance recovery.
Priority should be given to activities that directly complement timely attainment of desired future conditions and processes. In another words projects should assure attainment and perpetual maintenance of desired future conditions in the most advanced recovery areas first or in the case of a restoration project bridge any gap until natural processes can maintain the function that was installed.

Definitions for Prioritization:

First number:
Priority 1- activities that address Goodman Creek

Priority 2-activities that address Cedar or Mosquito Creeks

Priority 3 – activities that address Steamboat Creek

++-Designation after first priority number indicates relative importance of timeliness and attainment of landowner cooperation to a listed issue.

Reach #-Second number depicts reach with the furthermost upstream reach (similar issue, impact or gradient) starting at 1 then increasing downstream, except for the following. For passage barriers this number will start with 1 for the lowest barrier below others within the system. Barrier problems that are parallel within a system will be prioritized between them using existing priority rankings based on separate state ranking systems. For significant Tributary instability issues, which may effect mainstem gravel budgets, the first digit will be a 0 followed by decimal point, then river reach #, then stream reach number.

Activities #-Third number - (1=protection, 2=assessment, 3=restoration)

Reaches and Initial Examples of Priorities

Goodman Creek

**Assess Tributary Channel Conditions and side-slopes for unstable slopes and in channel LWD loading*
Example of Priority = 1-0.21-2

**Assess Drainage for Culvert blockage, revetments and parallel riparian roads*
Example of Priority = 1 – 1 -2

**Assess for off-channel first-bench refugia for conditions and improvement projects*
Example of Priority 1-1-2
**Assess for valley-wall and bank slope stability and surface erosions problems*

Example of Priority 1-1-2

For Mosquito and Cedar same issues would be assessed using a 2 in the first diigit

For Steamboat same issues would be assess using a 3 in the first digit.

Long term Progress Guidance

It is recommended that overall progress for this plan should seek a balance between the highest priorities between these tributaries to be successful. I would suggest some equitable proportion of funding over a period of time perhaps 70% priority 1 projects and 30% priority 2 projects taking the highest of each first. I would then use the same breakdown for stream reach emphasis starting at the uppermost project being 70% then 30% for the next reach progressively with only opportunities, timeliness, and landowner willingness over-riding these allocations.

At some time objective standards instead of funding levels needs to be incorporated such as cumulative pool volume protected/increased, acre years protected/gained in achieving desired riparian future conditions, etc..

Measurement of Success of Protection

Habitat degradation has to be considered in the terms of decades and the ongoing change of impacts to habitat function and to natural recovery following past activities on the landscape. New forestry regulations are not expected to have a positive impact on the fish habitat productivity in the near future. In fact, recent forestry and other land-use actions will have increasing negative impacts to fish habitat function and production for the near-term resulting from continuing loss of root cohesion, sediment aggradation, lack of LWD recruitment and other associated geologic and hydrologic disturbances to channel stability from harvest activities. Natural recovery can only begin to occur following the timeframe envisioned for recovery of each functional element. As one example, if the most recent harvest of a riparian leave strips now protected under the new FPA occurred recently under the old rules, the desired 140 year basal area future condition for standing trees will not be met for at least 140 years. Recruitment of functional sized LWD to an adjacent channel will be minimal until functional sized trees first grow then recruit to channels, while in the meantime conditions for in-channel LWD and pool habitat complexity will continue to degrade as pool-forming LWD decays or is removed by high flows. At best LWD recruitment and/or loss for the next 50 to 60 years could be expected to be no better than under the old rules. Road maintenance and abandonment plans are not expected to produce results until after those deadlines are reached. Recent loss of inner gorge channel substrate and banks from debris flows originating from road side-casts and head-wall failures following harvest show signs of little or extremely slow recovery.

In summary, near term measurement of success will occur in terms of reduced risk or reduction of expected losses until this strategy reaches the point of meeting a timeframe

identified in regulations and other resource protection activities for meeting certain desired future conditions. This strategy is expected to first reduce the rate of current habitat loss then eventually reverse that trend.

Direct Fish Habitat Restoration Projects

For the strategy on these independent drainages direct restoration projects refer to those that directly manipulate in-stream habitat or natural habitat protection functions or habitat forming functions (ie. LWD placement, riparian conversions, spalts removal, stabilization of unstable slopes with natural vegetation, etc.) . The TRG prioritization toward protection of multiple mainstem species on larger watersheds limits and greater data gaps in these drainages limits such projects.

Correction of the significant fish passage and habitat access issues might affect an overall reduction in loss of freshwater habitat production functions in the short term. However, few of the culverts in these drainages have been assessed.. Where blocked culvert crossings have been abandoned on forestlands or where culverts under current use block fish passage the forest industry has obtained a regulatory delay to identify a timeframe under which repair will be required. This change has been adopted under the new rules partly due to the strict requirements under the old rules not being enforced.

In summary, physical restoration of direct fish habitat functions is not a high priority of the TRG for these independent drainages to the Ocean. Upon further watershed assessments physical restoration activities may be proposed which protect areas from the impacts of degradation occurring in adjacent areas. As one example, marginal direct habitat improvement may occur where projects to protect other areas of existing habitat and habitat forming functions are protected with in-stream structures that also provide good fish habitat attributes, such as LWD revetment structures. Areas such as the ends of revetments already have the requisite access for equipment. A second example would be planting a riparian strip along a former cleared parcel of land newly protected by an acquired easement. A third example would be planting vegetation to stabilize banks or hillsides.

Note: The reader should refer to Appendix E within this Project Strategy for a list of the major limiting factors in the Goodman Complex basins.

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Cedar/Goodman/Mosquito

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Cedar	Cedar Creek	Remove cedar spalt blockages.	3500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N12W6	Rayonier
	Cedar	Cedar Creek	Remove cedar spalt blockages.	3300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W35	Rayonier
	Cedar	Cedar Creek	Remove cedar spalt blockages.	500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W35	Avery 80
	Cedar	Cedar Creek	Eliminate culvert blockage(s).	3600	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 26N12W32, OLD PEN PLY RD	
	Cedar	Cedar Creek	Eliminate culvert blockage(s).	1000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	possible coho	TRS 26N12W32, OLD PEN PLY RD	
	Cedar	Cedar Creek	Eliminate culvert blockage(s).	1000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 25N12W06, N 1113 RD	
	Cedar	Cedar Creek Tributary	Eliminate culvert blockage(s).	3000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 26N12W32, N1130 RD	
	Cedar	SF Cedar Creek	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W2	State
	Cedar	SF Cedar Creek	Remove cedar spalt blockages.	700	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W1	State
	Cedar Trib	Sand Creek	Remove cedar spalt blockages.	2500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W3	Rayonier
	Cedar Trib	Sand Creek	Remove cedar spalt blockages.	1400	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W11	State
	Cedar Trib	Sand Creek	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W12	State
	Cedar Trib	Sand Creek	Remove cedar spalt blockages.	800	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W11	Rayonier
	Cedar Trib	Sand Creek	Remove cedar spalt blockages.	500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W2	State
	Goodman	LB Tributary to Goodman Creek	Eliminate culvert blockage(s).	3000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 27N14W24, G 3300 RD	
	Goodman	LB Tributary to Goodman Creek	Eliminate culvert blockage(s).	2500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 27N14W24, G 3310 RD	
	Goodman	LB Tributary to Goodman Creek		2000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 27N14W24, G 3310 RD	
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	3500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 27N2W16, 2.7 MILE ON G 2100 RD	
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	1500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 27N13W16, 0.3 MILE ON G 2170 RD	

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Cedar/Goodman/Mosquito

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	2000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N13W15, 2.1 MILE ON G 2100 RD	
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	1500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27NJ13W15, 2.4 MILES ON G 2100 RD	
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	1000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N13NW16, 0.1 MILES ON G 2170 RD	
	Goodman	RB Tributary to Goodman Creek	Eliminate culvert blockage(s).	500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N13W16, 2.5 MILES ON G 2100 RD	
	Mosquito	Mosquito Creek	Eliminate culvert blockage(s).	4000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N13W10, G 3700 RD	
	Mosquito	Mosquito Creek	Eliminate culvert blockage(s).	2500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N13W10, G 3700 RD	

Hoh Basin Project Prioritization Strategy

Protect the Best/Restore the Rest!!!

Background

The Hoh River, the location of the Hoh Tribe, lies within Washington Treaty Tribal Fishing Usual and Accustomed Area (U & A) identified within the Treaty of Olympia, 1865 and acknowledged under U.S. vs. Washington, 1974. First prolonged contact with Indian residents by Europeans was documented when the stranded crew of the St. Nicholas, a Russian ship which ran aground near the mouth of the Quillayute River, 1807, spent the winter on the upper Hoh River. They reported utilizing Indian stores of "kisutch" salmon (the Indians had surrendered their stores and the upper river area to the Russians that winter). The river basin remains relatively isolated and sparsely populated. Managed forestland and the Olympic National Park are its primary land-uses while a public highway, county and the ONP roads lie upon much of the bank or within the riparian area of the lower 38 miles of the river. Scattered mainstem agricultural lands and residences make up the remaining uses. Within this basin the fish resources have been the main sustenance of the Hoh Indian People from pre-Treaty times. More recently sport fishing for Hoh River fish has become an important destination for sport fishers. Concern for the increased impacts to aquatic habitat from human impacts and the downward trends of many salmonid species has led to increased recovery efforts.

Recovery Activities

Three general categories of recovery activities are identified for the Hoh River Strategy to Protect and Restore Hoh River Wild Stocks and their Habitat Productivity. 1) The First is Protection of Habitat and Habitat Forming Processes that contribute significantly to the overall salmonid ecology through regulation of potentially impacting human land-use and resource extraction activities and implementation of actions to protect normally functioning areas from the progression of impacts from adjacent areas. This category could also include education, of landowners and the general public regarding stewardship and the purchase of conservation easements or land where significantly impacting activities are still permitted, or are otherwise expected to occur. 2) The Second is Collection of information where data gaps exist within areas of significant fish use and land-use activity or resource extraction. 3) The Third is the Conduct of restoration projects to reinstate or advance the recovery of habitat, habitat protection processes and habitat formation processes that affect the salmonid ecology. The effects of past and future land-use regulation on recovery under present, expected and desired future conditions will be evaluated in terms of any additional recovery and restoration activities considered for the Hoh River. The regulations, which are still in flux, include the Jefferson County Unified Development Code (Jeff. C. UDC), addressing non-forest lands and forestland conversions, and the Forest Practices Act (FPA) covering private and state forest lands. Other complementary forest practices regulations include the developing

Middle/Upper Hoh River Watershed Analysis (setting prescriptions for non-riparian forestry issues for both private and state managed forest lands), and the Washington Department of Natural Resources Habitat Conservation Plan (WDNR-HCP) covering state management of state and county forest trust lands. The WDNR-HCP implementation plan is still under development. The Forest Practice Act is currently under revision to address existing and potential ESA salmonid listings in a negotiated framework agreed to by the timber industry, state and federal fishery agencies.

Significant impacts to salmonid ecology have resulted from floodplain and riparian infrastructure (roads, revetments, houses, etc.) that impede normal habitat and channel function. Protection of such structures from channel cutting under emergency activities and regulations increases this impact beyond that of the original structures as flows encounters the constructed hard points while increasing the cutting of the banks further downstream along and below such structures. The increasing size and number of revetment structures and roads lying within the influence of the river and its tributaries shall be anticipated with countermeasures proposed to counter this trend and reduce the presence of such structures (WR20-LFA, page 90). Most revetments are installed and protected through emergency federal funding and regulation with inadequate initial review under the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA) and inadequate provision for mitigation following such actions. In a channel meander river system such as the Hoh with steeper valley walls and important public transportation roads dominating the river bottom, such structures create a major obstacle to cumulative recovery.

The TRG initially recommended the Hoh River for Tier 1 Protection Activities. It placed within the highest category for protection because it is an independent drainage within the region that has four stocks of wild salmon and steelhead managed independently from other managed stocks, one ESA listed stock (Bull Trout) and summer run steelhead. The salmon and winter steelhead are managed within the Hoh River for Treaty/Non-Treaty In-river Catch Sharing and Spawning Escapement Objectives set yearly by the state, federal and tribal governments.

The TRG's prioritization recognizes the above diversity of stocks, the overall historic versus current continued productivity of the Hoh River Basin stocks and the Concern for Protection of Bull Trout throughout the Basin as a regional priority.

Priorities for the above Activities are recommended with further separation recommended to be set by Stream Reach location rationale. Examples follow based on the combined rationale:

Priority 1—Mainstem Protection - (WRIA 20 Limiting Factors Analysis (WR20-LFA), pages 88 & 89)

Protection of the greatest number of salmonid stocks, anadromous and non-anadromous is identified for mainstem of the North Fork (NFH) and South Fork (SFH) Hoh River extending from the headwaters to the river mouth. This priority fits with the current

mosaic of common transportation corridors, other infrastructure, accompanying river revetments, non-forest land-use and accompanying weaker regulations occurring along the mainstem rivers below the ONP Ranger Station and upper ONP boundaries. Protection would include any project, which protected full function of river floodplain and channel-migration, first bench wetland and refugia habitat and its connectivity, adjacent riparian areas, and adjacent bank and immediate adjacent valley-wall stability. These processes affect the habitat that these species would be expected to use during one or more of their life history stages including seeking refuge from extreme flows. This priority would also include any assessment or restoration activities associated with attaining such protection or advancing the associated recovery time.

Prioritization among multiple potential projects within Priority 1 should give priority to furthest upriver reaches for protection first except where opportunities, timeliness and the willingness of landowner or other cooperators dictates. Two rationale are utilized to set these priorities; 1) Unstable headwalls increase in size closer to the river's headwaters in the less confined anadromous reaches, therefore unraveling and instability aggravated by human impact begin furthest upriver potentially increasing its impact as the cumulative force (bank unraveling and gravel aggradation) advances downstream. 2) The upper end of the anadromous spawning reaches (near RM 48 NFH and RM 11.0 SFH) for coho, spring/summer chinook, bull trout and steelhead occurs within the ONP, with bull trout known currently to spawn mostly at the upper end or above coho and chinook, while all stocks tend to rear in and utilize the full downstream reaches of the river, its side-channels and refugia as they gradually shift downstream or as adults on their return upstream. Fall chinook spawn as far as up to RM 38.2 within ONP. Therefore, initial efforts should take the most direct advantage by advancing recovery in immediate downstream juvenile rearing and refugia areas below ONP first.

Bull Trout/Dolly Varden have been reported to have been in larger numbers historically on the Hoh River and were heavily harvested by individuals who prized their quality for smoking (Russ Thomas, Renowned Forks Sportsman, 4/12/2001, personal communication). Mr. Thomas also reported that these "dolly varden" populated the Queets River and Raft River.

The process of physical channel and habitat recovery is also assumed to have its greatest chance of success if the furthest upstream and upslope reaches are stabilized first. The slope instability (human induced and natural) generally increases further up the watershed below the ONP. It is assumed that the attainment of desired future riparian stand conditions upriver will also provide functional size wood for habitat and channel stability earlier to comparatively narrower upriver channels than larger channels downriver (WR20-LFA, page 91). This will also be a function of earlier curtailment of harvest on steeper state lands, current road and revetment location, windthrow and more stringent future forestry regulation under continuing land-use patterns reflective of the land-use distribution and regulations depicted in the following paragraph. The greatest benefit to all stocks is assumed to occur if the progeny of the earliest upriver fish enter and can obtain lengthened rearing times in expanded upriver areas of recovered habitat during their freshwater rearing stages.

Uppermost mainstem reaches include land managed by the Olympic National Park (ONP), Washington State Department of Natural Resources (WDNR-HCP) to the confluence of the North Fork Hoh and South Fork Hoh. Below ONP (RM 30.0) mainstem reaches are adjoined by Private Forestry Lands (Regulated under the Forest Practices Act (FPA) and Mid-Hoh WAU Watershed Analysis (WSA)-for mostly non-riparian issues), and residences and agricultural land covered under the Jefferson County Unified Development Code (UDC) from the ONP boundary to the Oxbow. Below the Hoh River Oxbow private residences covered under the Jefferson County (UDC) are interspersed along the mainstem with smaller timberland parcels regulated under the FPA. The most conservative regulations in order are assumed to coincide with ONP management, WDNR-HCP, FPA/WSA regulation (mid-Hoh), FPA (lower-Hoh), and the Jeff. C.UDC. (under appeal to improve Critical Area and Shoreline protections).

Priority 2 - Tributary Protection

The rationale between the multiple sub-priorities of Priority 2 is similar to that for Priority 1. The difference from Priority 1 projects is our current understanding that fewer stocks are being affected in each of these tributary areas. Land management and ownership primarily reside under WDNR and Industrial Timberlands in tributaries between the Oxbow and ONP. In tributaries below the Hoh River Oxbow (RM 15.2) the land is primarily in Industrial Timberlands ownership and management and it is expected to be more stringently regulated than pre-2000 regulations and more stringently than other future non-forestry land-use along the mainstem and existing public transportation corridors.

Protection of the Tributary floodplain and channel migration, associated wetland, connectivity above the first bench and riparian area adjacent to the their floodplain is identified for Hoh River Tributaries. These would include any project, which protected full function of tributary floodplain and channel-migration, first bench wetland and refugia habitat and its connectivity, adjacent riparian areas (WR20-LFA, page 91), and adjacent banks and valley-wall and inner gorge stability. These processes affect the habitat that salmonids would be expected to use during one or more of their life history stages including seeking temporary refuge from extreme flows. This priority would also include any assessment or restoration activities associated with attaining such protection.

Prioritization among multiple potential projects within Priority 2 should give priority to the furthest upriver/*upstream* tributaries for protection from slope and road instability *that poses risk to substantial low gradient unconfined channels downstream* except where opportunities, timeliness and the willingness of landowner or other cooperators dictates. Two rationale are utilized to set these priorities; 1) Unstable valley-walls, inner gorges, and banks increase in size closer to the river's headwaters in tributaries along the anadromous reaches of the river, therefore where unraveling and instability begin furthest upriver these tributaries contribute to that advance downstream. The next priority should be given to the furthest upstream anadromous tributary reaches where high bank cutting or unstable slope or unraveling of smaller tributary inner gorge and channel issues can be

successfully addressed. Other tributary issues should be addressed in the following order: 1) bank instability/riparian protection, and riparian stand condition in relation to LWD instream habitat (lack of LWD or aggradation of cedar spalts) and shade.

An important physical distinction is that slope and bank instability concerns persist along the whole expanse of tributaries along the north side of the Hoh River. On the south side of the Hoh River bank and slope instability issues become more isolated downriver of Mount Octopus as the terrain becomes gentler moving westward to the ocean.

Tributary reaches adjoin land owned by the Washington State Department of Natural Resources (WDNR-HCP & WSA regulation) and primarily Industrial Timberlands regulated under the FPA-WSA above the Hoh Oxbow. Below the Oxbow tributary reaches primarily adjoin Industrial Timberlands regulated solely under the FPA.

Definitions for Prioritization:

First number:
Priority 1 - activities that address the primarily mainstem habitat species

Priority 2 - activities that address primarily the tributaries habitat species

++-Designation after first priority number indicates relative importance of timeliness and attainment of landowner cooperation to a listed issue.

Reach #-Second number depicts reach with the furthermost upstream reach (similar issue, impact or gradient) starting at 1 then increasing downstream, except for the following. For passage barriers this number will start with 1 for the lowest barrier below others within the system. Barrier problems that are parallel within a system will be prioritized between them using existing priority rankings based on separate state ranking systems. For significant Tributary instability issues, which may effect mainstem gravel budgets, the first digit will be a 0 followed by decimal point, then river reach #, then stream reach number. (See Owl Creek below)

Activities #-Third number - (1=protection, 2=assessment, 3=restoration)

Reaches and Initial Examples of Priorities

South Fork Hoh River above the Olympic National Park Boundary—RM 6.0 – 11.5

This section of river is essentially fully protected under Olympic National Park Regulations from significant human induced impacts to fish habitat and fish habitat forming function.

South Fork –RM 0.0 – 6.0-(Reach #=1)

*Obtain channel migration rate assessment of high banks (left bank above RM 2.0) for setting RMZ for harvest outside of RMZ and windthrow buffer—WDNR responsibility under HCP
Example of Priority Rating = 1 – 1 - 2
*Assess Potential Stabilization of debris flow Emptying onto Floodplain at Split Creek (RM 2.6)
Example of Priority Rating = 1-1-1
*Breach rip-rap located at top of side-channel below Split Creek on left bank (RM=2.2) and install log jam control
Example of Priority = 1 - 1- 2= 1-1-2
*Assess status of protection of Crippen Homestead riparian and spring source, channel meander rate, channel logjam fish use and stability and owner willingness to allow protections of this area.
Example of Priority Rating = 1-1-2

ONP-North Fork above the Hoh Ranger Station—RM 38.2 – 48.8

This section of river is essentially fully protected under Olympic National Park Regulations from significant human induced impacts to fish habitat and fish habitat forming function.

ONP-North Fork above the Olympic National Park Boundary/Confluence with the South Forks to the Ranger Station—RM 30.0 – 38.2 – (Reach#=1)

This section of river on the right bank looking downstream has a paved road within the riparian and floodplain which runs parallel to the river from RM 30.0 – 38.2 with extensive rock revetment along significant sections of the road and campground. The river's floodplain contains the Park Visitor Center, Housing and Campground Development at RM 38.2.

Mainstem & Floodplain

The Olympic National Park is:
Conducting a River Reach Assessment.
Relocating a section of road away from the river.
Stockpiling full-sized trees from the new road right of way at the river.
Exploring Options for location of Engineered Logjams and replacing rip-rap sections with large wood structures where appropriate.
Evaluating reconfiguration of Taft Creek egress channel revetment from rip-rap to LWD.
Proposed Project to provide egress to Park Boundary Pond – an oxbow cutoff by current boundary rip-rap and road dike.
***Assess impacts of windthrow near ONP entrance**
Example of Priority 1+ – 1 – 2
Storms in recent years may make this timely provided CMER is unwilling to make this an immediate priority under Forest Practices adaptive management objectives.
*Assess culvert passage and potential replacement at Twin Creek

Example of Priority = 1 – 1 - 2

Tributary road crossing at second bench
*Assess culvert passage and potential replacement at East Fork Twin Creek.
Example of Priority = 2 – 1- 2

Mainstem Hoh River from Park Boundary to Owl Creek – RM 30.0 – 27.2- (Reach#=2)

***Assess Huelsdonk Ridge slope stability issues and potential protection measures to protect Hoh River side-channel functions**
Example of Priority = 1+-2-2 (Currently a WDNR responsibility under Hoh/WDNR MOU)

*Assess status of Brandenbarry Lots (left bank at RM 29.0) and willingness of owners of unused lots to sell parcels based on site conditions, risk of flooding or river channel encroachment.
Example of Priority = 1-2 – 2

*Assess functioning of right bank rip-rap below Park Boundary at Lewis Ranch to add LWD jam at bottom to prevent unraveling & assess affects of removing upper level of berm placed on top of rip-rap and installation of other LWD analogs along rip-rap
Example of Priority = 1 - 2 - 2.
*Assess off-channel and groundwater availability in areas across floodplain from filled-in and river captured Canyon Spring Pond for development of summer and winter refugia habitat pond.
Example of Priority = 1 -2 –2 (replacement of former large coho pond lost to dam break flood event on adjacent Canyon Creek in 1989 and river channel meander in 1999.
Example of Priority = 1 – 2 –2

****Assess bank stability and channel meander rate with a reach analysis for right bank at Canyon Creek in regards to new FPA application and Jefferson County Public Works Proposals to stabilize their road. Edge of Riparian and road relocation issues come into play here.**
Example of Priority = 1++ - 2 - 2
The timeliness issue and lack of address of provision for the Best Available Expertise between Project Proponents elevates this project above others.

EXTENDED MULTI-AREA MAINSTEM & TRIBUTARY PROJECTS

****1/ Institute standing conifer tree bank along non-riparian right of ways and other accessible tree stands for future tree revetment projects by purchase from right of way and accessible timberland parcels along areas of revetment impacts and near areas for potential LWD habitat installation.**
Example of Priority = 1+- 2 - 1

Upper Owl Creek

*Assess Tributary Channel Conditions and side-slopes for projects to stabilize unstable slopes and install functional wood debris in channel--Use WSA Analysis for initial assessment
Example of Priority = 2-0.21-2

*Assess removal of Canyon Creek Culvert blockage
Example of Priority = 2 – 1 –2

*Assess left bank off-channel complex above and at Fletcher Ranch for protection, etc.
Example of Priority = 1 – 1 -2

Mainstem Hoh River from Owl Creek to Morgan's Crossing - RM 27.2 - 24.2 – (Reach #=3)
****1/ See above**
Example of Priority = 1 –3 -1

*Assess functioning of Right Bank rip-rap, adjacent road location, and Jefferson County Log Jam @ RM 24.3.
Example of Priority = 1 - 3 - 2
Tower Creek and Rock Creek
*Remove concrete study weirs.
Example of Priority = 2 - 1 – 3
Clear Creek, Red Creek and Young Slough
*Assess channel and riparian conditions and propose projects to increase channel refugia complexity, accessibility, depths and improve riparian stand conditions
Example of Priority = 1- 3 - 2

Mainstem Hoh River from Morgan's Crossing to Willoughby Creek - RM 24.4 - 19.0 – (Reach#=4)
****1/ See above**
Example of Priority 1 –4 -1

*Assess functioning of right bank rip-rap, adjacent road location, and riparian and LWD conditions & RM 24.3 & RM 20.0 - 19.0.
Example of Priority 1 - 4 - 2
*Assess bank stability of high bank and aquifer recharge issues across from Upper Hoh Store (Red Creek Bluffs) RM 22.0
Example of Priority 1 - 4 – 2
Willoughby Creek
*Assess riparian conditions and upper and lower channel conditions and LWD placement projects.
Example of Priority 2-(1-2)-2

*Assess Willoughby Creek bank and valley-wall stability on upper watershed
Example of Priority 2 – 1-2
Mainstem Hoh River from Willoughby Creek to the Hoh River 101 Bridge - RM 19.0 – 15.2 – (Reach#=5)
****1/ See above**
Example of Priority 1 –5 -1

Domrud Pond
*Assess this off-channel first bench refugia pond for conditions and improvement projects
Example of Priority 1-5-2a

Schmit Bar Complex
*Assess this off-channel first bench refugia pond for conditions and improvement projects
Example of Priority 1-5-2b
Domrud Pond is already known to be a more highly productive pond. so it got a higher priority

Elk Creek Floodplain
*Assess FPA/Shoreline regulatory issues, review current land management objectives and/or agreements to determine options for protection of Persistent Spruce Conifer Islands and condition of Logjams at top of crossing river side-channels.
Example of Priority 1-5-2
Elk Creek
*Assess upper Elk riparian, LWD, bank protection and channel sedimentation issues in regards to private forestry plans and expected progress on road maintenance and abandonment plans.
Example of Priority 2-(1-2)-2
****Assess middle Elk Creek riparian windthrow problems from RM 1.0 – 2.7 for study dependent on timeframe of the FPA CMER process.**
Example of Priority 1+-3-2(elevated from 2-3-2 project for relevance throughout coastal region)

Winfield Creek
*Assess Winfield Creek Riparian areas to apply experimental forest prescriptions in order to advance recovery toward Desired Future Conditions under the WDNR-HCP.
Example of Priority 2-(1-5)-2 –Already funded and to be jointly administered by Hoh Tribe and WDNR
*Assess Winfield Creek DNR Gravel Pit sediment input and impacts to Winfield Creek and recommend remedies.
Example of Priority 2-2-(2 & 3)—Done under Hoh Tribe/DNR agreement.
*Assess Upper Winfield Creek/St. Regis Road Maintenance Plan
Example of Priority 2-1-2
Upper Hell Roaring Creek and Alder Creeks
*Remove cedar spalts from clogging channels, restricting fish access and collecting silt

Example of Priority 2-1-3
Alder Creek East Fork above Rainforest Road
*Replace blocking culvert
Example of Priority 2-(2-3)-3

Mainstem Hoh River from the Hoh River 101 Bridge to Cottonwood Campground- RM 15.2 – 12.5 – (Reach#=6)
****1/ See above**
Example of Priority 1 –6 –1

*Assess Hoh River bank stability and the channel migration rate on the right bank below the 101 bridge to determine edge of future riparian and shoreline of the state. (RM 15.0 – 13.0)
Example of Priority 1+-6-2 –As with the Canyon Creek in reach 3 below ONP the priority of this depends on future harvest plans and what required expertise is brought to bear on a FPA/Shoreline issue.
***Install LWD and other measures at highway 101 left bank rip-rap to prevent further unraveling downriver exploring cooperation and funding by WDOT.**
Example of Priority 1+-6-3
**Assess installation of LWD analogs to replace 1 ½ miles of rip-rap and relocation site options for Highway 101 & projects to redirect river flow toward Anderson Property.
Example of Priority 1+-6-2
**Assess landowner willingness to allow continued site access, full habitat enhancement projects or conservation easements or acquisition on former Anderson Ranch within floodplain complexes with thorough mapping of channels and water availability
Example of Priority 1-6-2

Mainstem Hoh River from the Cottonwood Campground- to Nolan Creek RM 12.5 - 6.0 – (Reach#=7)
****1/ See above**
Example of Priority 1 –7 –1
**Assess channel access from river into Lost Creek's floodplain.
Example of Priority 1- 7 - 2
**Assess landowner protection issues for Cassel Homestead and Cottonwood side-channel protection.
Example of Priority 1 – 7 – 2

Lost Creek
**Assess upper Lost Creek riparian desired future condition status in upper reaches.
Example of Priority 2-1-2 (2 for tributary, 1 for uppermost tributary areas with potential bank stability & LWD recruitment problems, 2 for filling a data gap.)

Pins Creek Floodplain
**Assess landowner willingness to allow establishment of riparian conifer trees along Pins Creek river floodplain channels.

Example of Priority 1 – 6 – 2 (1 for floodplain refugia, 6 for river reach, 2 for filling information gap.)
Pins Creek
**Assess upper Pins Creek riparian desired future condition status and bank stability to determine origin and nature of increased turbidity and potential repair projects.
Example of Priority 2-1-2 (2 for tributary, 1 for uppermost tributary areas with potential bank stability & LWD recruitment problems, 2 for filling a data gap.)

Mainstem Hoh River from the Nolan Creek RM =8 to the Hoh River Mouth RM 8.0 – 0.0 – Reach#=8)
****1/ See above**
Example of Priority 1 –8 –1
Nolan Creek
**Assess Nolan Creek riparian desired future condition status, bank instability and channel meander/LWD issues.
Example of Priority 2-1-2 (2 for tributary, 1 for uppermost tributary areas with potential bank stability & LWD recruitment problems, 2 for filling a data gap.)
****Assess Hoh River Channel Migration rates where appropriate geomorphic expertise is unavailable to forestry and county land-use regulators.**
Example of Priority (1+ higher priority thought to affect floodplain channels & decreasing off-channel refugia as the Hoh River broadens in recent years (affecting river reaches 6-8), 2 for filling a data gap.) (ie. 1+ - (6-8) – 2)
****Assess North side of river steep gradient tributary channels, channel banks, forest roads, inner gorges and basin walls to access unstable slopes and resulting habitat problems. (or Conduct a Watershed Analysis below the Hoh River Oxbow)**
Example of Priority (1+ higher priority thought to affect floodplain channels & decreasing off-channel refugia as the Hoh River broadens in recent years (affecting river reaches 6-8), 2 for filling a data gap.)

**Assess landowner willingness to provide access, re-establish riparian conditions and protect those areas through agreement or other means specifically targeting the non-operating gravel pit operation at G&L shake.
Example of Priority 2-8-2

Braden Creek Floodplain
**Assess fish usage and protection options for this left bank side-channel from RM 1.5 to RM 4.0 which is the best on lower river.
Example of Priority 1-8-2

Braden Creek
**Assess Braden Creek progress toward desired future riparian conditions or potential projects to advance conifer release and dominance.
Example of Priority 2-1-2

Barlow-Charlie Anderson/Right Bank & Side-channel (RM<1)

*Assess channel conditions above and below rip-rap and function of rip-rap on downstream and potential to use LWD placement to improve functioning, habitat protection.
Example of Priority 1-8-2

Left Bank - Lower Hoh to Mouth
*Asses channel conditions from below lowest Hoh Reservation barb/groin for LWD jam and LWD/crib just above mouth.
Example of Priority 1-8-2

Long term Progress Guidance

It is recommended that overall progress for this plan should seek a balance between the highest priorities between the river sections and the tributaries to be successful. I would suggest some equitable proportion of funding over a period of time perhaps 70% priority 1 projects and 30% priority 2 projects taking the highest of each first. I would then use the same breakdown for stream reach emphasis starting at the uppermost project being 70% then 30% for the next reach progressively with only opportunities, timeliness, and landowner willingness over-riding these allocations.

At some time objective standards instead of funding levels needs to be incorporated such as cumulative pool volume protected/increased, acre years protected/gained in achieving desired riparian future conditions, etc..

Measurement of Success of Protection

Habitat degradation has to be considered in the terms of decades and the ongoing change of impacts to habitat function and to natural recovery following past activities on the landscape. New forestry regulations are not expected to have a positive impact on the fish habitat productivity in the near future. In fact, recent forestry and other land-use actions will have increasing negative impacts to fish habitat function and production for the near-term resulting from continuing loss of root cohesion, sediment aggradation, lack of LWD recruitment and other associated geologic and hydrologic disturbances to channel stability from harvest activities. Natural recovery can only begin to occur following the timeframe envisioned for recovery of each functional element. As one example, if the most recent harvest of a riparian leave strips now protected under the new FPA occurred recently under the old rules, the desired 140 year basal area future condition for standing trees will not be met for at least 140 years. Recruitment of functional sized LWD to an adjacent channel will be minimal until functional sized trees first grow then recruit to channels, while in the meantime conditions for in-channel LWD and pool habitat complexity will continue to degrade as pool-forming LWD decays or is removed by high flows. At best LWD recruitment and/or loss for the next 50 to 60 years could be expected to be no better than under the old rules. Road maintenance and abandonment plans are not expected to produce results until after those deadlines are reached. Recent loss of inner gorge channel substrate and banks from debris flows

originating from road side-casts and head-wall failures following harvest show signs of little or extremely slow recovery.

In summary, near term measurement of success will occur in terms of reduced risk or reduction of expected losses until this strategy reaches the point of meeting a timeframe identified in regulations and other resource protection activities for meeting certain desired future conditions. This strategy is expected to first reduce the rate of current habitat loss then eventually reverse that trend.

Direct Hoh River Fish Habitat Restoration Projects

For the Hoh River strategy direct restoration projects refer to those that directly manipulate in-stream habitat or natural habitat protection functions or habitat forming functions (ie. LWD placement, riparian conversions, spalts removal, stabilization of unstable slopes with natural vegetation, etc.) . The TRG prioritization toward protection of multiple mainstem species limits such projects because of the magnitude of flow regimes on this river and the limited heavy equipment access for most channel work. Many direct restoration activities on the Hoh River would be premature, given the timeframes identified to achieve desired future conditions under forest regulations, the scope of mainstem Hoh River channel problems and the lack of current meaningful protections where infrastructure and other non-forest land-uses further constrain normal habitat functions.

Correction of the significant fish passage and habitat access issues might affect an overall reduction in loss of freshwater habitat production functions in the short term. However, some of the remaining major culvert blockages on the Hoh River occur under public access roads requiring a large capitol investment to replace, while most of the cost is related to maintaining high road standards. Yet, those culverts will eventually need replacement without use of restoration funds. Where blocked culvert crossings have been abandoned on forestlands or where culverts under current use block fish passage the forest industry has obtained a regulatory delay to identify a timeframe under which repair will be required. This change has been adopted under the new rules partly due to the strict requirements under the old rules not being enforced.

In summary, physical restoration of direct fish habitat functions is not a high priority of the TRG for the Hoh River except within the framework of a project that is meant to meet a protection objective along the mainstem. . As one example, marginal direct habitat improvement may occur where projects to protect other areas of existing habitat and habitat forming functions are protected with in-stream structures that also provide good fish habitat attributes, such as LWD revetment structures. Areas such as the ends of revetments already have the requisite access for equipment. A second example would be planting a riparian strip along a former cleared parcel of land newly protected by an acquired easement.

Note: The reader should refer to Appendix E within this Project Strategy for a list of the major limiting factors in the Hoh Basin.

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Lower Hoh Trib	Anderson Creek	Remove cedar spalt blockages.	200	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W2	Rayonier
	Lower Hoh Trib	Braden Creek	Remove cedar spalt blockages.	4000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W30	State
	Lower Hoh Trib	Braden Creek	Eliminate culvert blockage(s).	5500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26M12W29, OLD PEN PLY RD	
	Lower Hoh Trib	Cassel Creek	Eliminate culvert blockage(s).	4000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 26N12W07, 3.5 MILE ON OIL CITY RD	
	Lower Hoh Trib	Fullerton Tributary	Remove cedar spalt blockages.	6000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W26	Rayonier
	Lower Hoh Trib	Lost Creek	Remove cedar spalt blockages.	500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W9	John Hancock
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	2000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W15	State
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	1100	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W15	State
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W19/20	State
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W26	Rayonier
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W29	State
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	800	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W20	State
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	800	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W24	Rayonier
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	600	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N13W24	John Hancock
	Lower Hoh Trib	Nolan Creek	Remove cedar spalt blockages.	400	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W20	State
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	10000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 26N13W24, N 1000 RD	
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	5200	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 26N12W20, N 1000 RD AT PEN PLY RD	
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	2000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N12W22, N 1000 @ N 1060 RD	

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	1600	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 26N12W22, N 1063 RD	
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	1300	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N12W20, 2 MILES ON N 1000 RD	
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	3600	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N12W28, PEN PLY RD	
	Lower Hoh Trib	Nolan Creek	Eliminate culvert blockage(s).	600	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N12W28, PEN PLY RD	
	Lower Hoh Trib	Nolan Creek	Impacted Range 1 - 3		Habitat Rating: Fair	LFA		Coho, steelhead, fall chinook		
	Lower Hoh Trib	Nolan Creek/Chow Chow	Remove cedar spalt blockages.	1000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W24	Rayonier
	Lower Hoh Trib	Nolan Trib: 20.0431	Impacted Range 0 - 1		Habitat Rating: Poor	LFA		Coho, steelhead		
	Lower Hoh Trib	Pins Creek	Remove cedar spalt blockages.	1200	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N12W16	State
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	4000 + 20 acres off channel rearing	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho	TRS 2612W06, H 4060 RD Cottonwood	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	5700	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 26N13W22, 8.3 MI ON OIL CITY RD	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	4000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 27N2W33, 0.5 MILE ON OIL CITY RD	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	2500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N12W5, OIL CITY RD (TWO CULVERTS)	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	2500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 26N13W16, H 4500 RD	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	4000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N12W06, 3 MILE ON OIL CITY RD	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	2500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N13W16, 0.9 MILE ON H 4500 RD	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	1500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N13W15, 0.6 MILE ON H 4500	
	Lower Hoh Trib	RB Tributary to Hoh River	Eliminate culvert blockage(s).	1300	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N13W16, H 4500 RD	

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Lower Hoh Trib	RB Tributary to Hoh River (2 culverts)	Eliminate culvert blockage(s).	several acres of off channel rearing	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N12W04, SUNDOWNER LOTS RD	
	Lower Hoh Trib	RB Tributary to Hoh River (2 culverts)	Eliminate culvert blockage(s).	several acres of off channel rearing	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 26N12W04, COTTONWOOD RD (RAYONIER)	
	Mainstem Hoh	Alder Creek Bottom	Refugia Priority #							
	Mainstem Hoh	Anderson Creek Bottom	Refugia Priority #							
	Mainstem Hoh	Braden Creek Bottom	Refugia Priority #							
	Mainstem Hoh	Clear Creek Bottom	Refugia Priority #		Needs restoration: gravel aggradation, harvested flooplain forest					
	Mainstem Hoh	Elk Creek Floodplain Complex	Refugia Priority #							
	Mainstem Hoh	Hoh (Brandeberry) Lots	Refugia Priority # - Floodplain Development Problems, Mass Wasting impacts							
	Mainstem Hoh	Hoh River	Impacted Range 0-1.1, 19.5-20.2, 44-46, 47.5 47.8 (Jill questions the last two segments…the ONP roads are RM 36 on, right)		Habitat Rating: Poor	LFA		Coho, steelhead, chinook, sockeye (?), *bulltrout*		
	Mainstem Hoh	Pole Creek Bottom	USFS Late Successional Reserve, channel degraded, road a problem							
	Mainstem Hoh	Schmidt Bar	Refugia Priority #							
	Middle Hoh	Hoh Oxbow	Allen's Mill Grade to Winfield		Inner Gorge failures	Hoh Tribe		All		
	Middle Hoh Trib	Canyon Creek	Eliminate culvert blockage(s).	4800	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 27N11W25, 9.7 MILE UPPER HOH RD	
	Middle Hoh Trib	Clear Creek	Remove cedar spalt blockages.	1300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N11W4	State
	Middle Hoh Trib	Clear Creek	Remove cedar spalt blockages.	800	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N11W3	State

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Middle Hoh Trib	Clear Creek	Remove cedar spalt blockages.	300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N11W3	State
	Middle Hoh Trib	Clear Creek	Channel restoration\channel aggradatior	4500	Access\Spawning\Rearing	Hoh Tribe Focus Project List	Restoration	coho, cutthroat	TRS 27\11\33	Lincoln
	Middle Hoh Trib	Dismal Creek	Eliminate culvert blockage(s).	10500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, steelhead, cutthroat	TRS 27N11W35, UPPER HOH ROAD	Jefferson County
	Middle Hoh Trib	Elk Creek	Remove cedar spalt blockages.	800	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N11W9	State
	Middle Hoh Trib	Elk Creek Tributary	Eliminate culvert blockage(s).	3200	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 26N11W04, CLEARWATER MAINLINE	
	Middle Hoh Trib	Hell Roaring Creek	Eliminate culvert blockage(s).	?	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	NUMEROUS BLOCKAGES NOT YET SPECIFIED	
	Middle Hoh Trib	Iota Creek	Eliminate culvert blockage(s).	700	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N10W32, H 1000 RD 6.5 MILES	
	Middle Hoh Trib	LB Tributary to Alder Creek	Eliminate culvert blockage(s).	10500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	coho, cutthroat	TRS 27N1223, UPPER HOH ROAD	
	Middle Hoh Trib	LB Tributary to Pole Creek	Eliminate culvert blockage(s).	3500	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N11W27, 8.5 MILE UPPER HOH RD	
	Middle Hoh Trib	Maple Creek	Road maintenance, mass wasting potential and occurrence			Hoh Tribe Focus Project List	Restoration	cutthroat		
	Middle Hoh Trib	Maple Creek	LWD Placement		Channel degradation	Hoh Tribe Focus Project List	Restoration	cutthroat		State
	Middle Hoh Trib	Owl Creek	Road maintenance, mass wasting potential and occurrence			Hoh Tribe Focus Project List	Restoration	Chinook, steelhead, cutthroat		State
	Middle Hoh Trib	Owl Creek	High Tributary restoration priority.Debris flow impacts, wood out of channel, sediment aggradatior							
	Middle Hoh Trib	Owl Creek	Impacted Range 0 - 1.8		Habitat Rating: Poor	LFA		Coho, steelhead, fall chinook		
	Middle Hoh Trib	Pole Creek	Eliminate culvert blockage(s).	5000	Access - Culvert(s)	Hoh Tribe Focus Project List	Access	cutthroat	TRS 27\11\27	Rayonier
	Middle Hoh Trib	RB Tributary to Hoh River	Remove cedar spalt blockages.	300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 27N12W28	State
	Middle Hoh Trib	RB Tributary to Iron Maiden	Eliminate culvert blockage(s).	1700	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N10W31, H 1000 H 1064 RDS	
	Middle Hoh Trib	Red Creek	Remove cedar spalt blockages.	6500	Water quality impacts to headwater wetland	Hoh Tribe Focus Project List	Restoration	cutthroat	TRS 27\11\33	Lincoln

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Middle Hoh Trib	Red Creek	Remove cedar spalt blockages.	500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 27N11W33	John Hancock
	Middle Hoh Trib	Rock Creek	Eliminate culvert blockage(s).	3300	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	steelhead, cutthroat	TRS 27N11W04, H 3100 RD	
	Middle Hoh Trib	Rock Creek	Remove UW research weir or provide fish passage							
	Middle Hoh Trib	Winfield	Remove cedar spalt blockages.	200	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 26N11W5	State
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	1500	Access - Culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\02 North Winfield Road behind Pit	Lincoln
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	1200	Access - culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\01 Old grade off North Winfield Road	Lincoln
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	6000	Access - culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\01 Old grade off North Winfield Road	Lincoln
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	1000	Access - culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\01 Old grade off North Winfield Road	Lincoln
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	<1000	Access - culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\02 St Regis Road (fixed?)	Lincoln
	Middle Hoh Trib	Winfield	Remove cedar spalt blockages.	2500	Access - Spalts	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\01 Below H-1100 Road Pipe	Lincoln
	Middle Hoh Trib	Winfield	Remove cedar spalt blockages.	2000	Access - Spalts	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\01 and 12 St Regis Road below new bridge	Lincoln
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	1000	Access - Culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\11\06 H-1100 Road	State
	Middle Hoh Trib	Winfield	Road maintenance, mass wasting potential and occurrence	2000	Road Maintenance	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\11\06 H-1100 Road	State
	Middle Hoh Trib	Winfield	Eliminate culvert blockage(s).	2000	Access - Culvert(s)	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\11\07 H-1130 Road	State

North Olympic Peninsula Lead Entity
Prioritized List of Activities and Concepts for Watershed
WRIA No. 20 – Geographic Unit: Hoh

Priority No.	Watershed	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Stream Length Impacted (feet)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Type (Restoration, Protection, Assessment/Study, Combination)	What fish stocks and/or populations will benefit?	Location Information (tributaries, Watershed No., river mile, nearshore area, etc.)	Landowner
	Middle Hoh Trib	Winfield	Remove cedar spalt blockages.		Mass Wasting Potential	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\12\13 CHECK LOCATION	State
	Middle Hoh Trib	Winfield	Remove cedar spalt blockages (and culverts??)	3000	Access - Spalts and Mass Wasting Potential	Hoh Tribe Focus Project List	Restoration	coho, steelhead, cutthroat	TRS 26\11\05 H-1230 Road	State
	Middle Hoh Trib	Winfield	RMZ Easement or Purchase Priority #							
	Middle Hoh Trib	Winfield	High Tributary restoration priority. Sedimentation impacts, mass wasting impacts in upper tributaries, RMZ treatment and LWD placement proposed							
	Middle Hoh Trib	Winfield	Impacted Range 2 - 3.5 (add in the lower mile from the Pit influence?)		Habitat Rating: Fair	LFA		Coho, steelhead, fall chinook		
	Middle Hoh Trib (Alder Creek Trib)	Snell Creek	Remove cedar spalt blockages.	300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 27N12W23	State
	SF Hoh	Crippen Homestead	Refugia Priority #							
	SF Hoh	LB Tributary to SF Hoh	Eliminate culvert blockage(s).	1000	Access - Culvert(s)	WRIA 20 LFA, Page 85	Restoration	cutthroat	TRS 27N10W33, H 1000 RD AT H 1070 RD	
	SF Hoh	SF Hoh	Numerous Crossings		Habitat Rating: Fair	LFA		Fall chinook, coho, steelhead, sockeye		
	Steamboat	Steamboat Creek	Remove cedar spalt blockages.	5400	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W10	Rayonier
	Steamboat	Steamboat Creek	Remove cedar spalt blockages.	2000	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W11	State
	Steamboat	Steamboat Creek	Remove cedar spalt blockages.	500	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W9	State
	Steamboat	Steamboat Creek	Remove cedar spalt blockages.	300	Access - Spalts	WRIA 20 LFA, Page 83	Restoration		TRS 25N13W11	Rayonier
	Steamboat	Steamboat Creek	Impacted Range 0.1 - 1.5		Habitat Rating: Fair	LFA		Coho, steelhead		
	Upper Hoh Trib	Mount Tom Creek	ERROR IN LFA. Mount Tom Creek has no roads.							
			Riparian Roads in the Hoh Basin (LFA) Note: this needs much more work...there's many more road segments							

Salmon Recovery in the Nearshore: A Shared Framework for the Hood Canal Coordinating Council and North Olympic Peninsula Lead Entities

Rationale for Joint Salmon Recovery Planning in the nearshore by the Hood Canal Coordinating Council (HCCC) and the North Olympic Peninsula (NOP) Lead Entities

Within Washington State some of the best remaining opportunities for assessment, protection, and restoration of ecological processes and functions that support Pacific salmon lie within the geographic area extending from Hood Canal through the Straits of Juan de Fuca, and along the Pacific Coast to the Hoh River. Therefore, to facilitate better communication, joint planning, and ultimately, we hope, higher potential success of salmon recovery, HCCC and NOP are working collaboratively to develop a shared nearshore framework. For the purposes of this shared nearshore framework, we have determined that the nearshore area extending from Hood Canal through the Straits and along the Pacific Coast to the Hoh River should be considered a single geographic unit. Treatment of the nearshore as a single geographic unit is consistent with the methods used to classify watersheds within the HCCC and the NOP. We recognize that within this single geographic unit, there is a diversity of nearshore ecosystems, but from the perspective of salmon these ecosystems are all ecologically connected.

Guiding Principle of the HCCC & NOP Shared Nearshore Framework

The guiding principle of our shared framework is *to assess, protect, and restore nearshore ecological processes and functions that support Pacific salmon.* To successfully implement this framework, nearshore activities must be closely coordinated with those in the watersheds, using an ecosystem approach to salmon recovery.

Definition of Nearshore

The nearshore is defined as *the area adjoining the land and the sea, and the coupled ecological processes (geological, primary and secondary productivity, sediment, and hydraulic processes) that affect this area's ability to function in support of Pacific salmon*. For the purposes of our shared nearshore framework, estuaries are considered part of the nearshore and are recognized as a vital connection to the watersheds. Thus, the inland extent of what we consider nearshore encompasses any habitat that is tidally influenced, including tidal freshwater, brackish, and marine habitats. The offshore extent of what we consider nearshore is more difficult to define because it varies significantly within the single geographic unit. Within some portions of this geographic unit, the offshore extent of the nearshore could be defined as the lower-limit of the photic zone

(approximately –30 feet MLLW). In other portions of the geographic unit, the nearshore could extend many miles offshore. It is principally for this reason that we developed a nearshore definition that is based on ecological processes that support Pacific salmon. Lynn (1998) defined the nearshore zone, within the Puget Sound / Georgia Basin, beginning 200 feet upland of the ordinary high-water mark and going seaward to a depth of 65 feet (~20 meters) below mean low water. We have not adopted these numerical definitions, but provide this information as a reference.

Background: Why is the nearshore important?

The nearshore is the interface between riverine and marine ecosystems and the principal source of interaction between people and the sea. Because of their focal location within the landscape, nearshore ecosystems are tremendously dynamic and complex, and they provide a wide array of functions for multiple plant and animals species, including Pacific salmon and their prey (Shreffler and Thom 1993). Nearshore ecosystems produce, trap, cycle, and export energy; filter domestic wastes; retain and modulate freshwater runoff; buffer adjacent land areas from the force of marine waters; provide critical habitat for fish and wildlife migrations, feeding, refuge, and reproduction; and moderate extremes in air and water temperature (Duxbury 1987, Thom 1987).

From a landscape ecology perspective, nearshore ecosystems are ecologically connected to riverine and marine ecosystems. Pacific salmon are often used as an indicator of the response of ecosystems to environmental and anthropogenic change, because their life cycle integrates changes across the continuum of ecosystems from watershed to nearshore to ocean (Bottom et al. 1998). When nearshore ecosystems become structurally or functionally disconnected or fragmented, because of either environmental or anthropogenic change, ecological processes are lost or degraded and Pacific salmon are adversely affected (Spence et al. 1996). Reduced connectivity increases fragmentation that alters the diversity of habitats at all landscape scales (Wissmar and Simenstad 1998). The National Research Council report on Restoration of Aquatic Ecosystems (National Research Council 1992) stressed that failure to restore aquatic ecosystems promptly will result in sharply increased rates of extinction of species or ecosystem types, and in permanent ecological damage. **Thus, there is an urgent need for protecting and restoring ecological connectivity at the landscape scale.**

The nearshore, and estuaries in particular, have been termed the life support system for juvenile Pacific salmon feeding, rearing, and migrating (Healey 1982, Simenstad et al. 1982). Juvenile chum (*Oncorhynchus keta*) and chinook (*O. tshawytscha*) salmon in particular are recognized as being fundamentally dependent on nearshore ecosystems. This fact is of heightened significance to HCCC and NOP, given that ESA-listed Hood Canal / Eastern Strait of Juan de Fuca summer chum salmon and Puget Sound chinook salmon occur throughout many of our nearshore ecosystems. Chinook and chum stocks, in the western Strait of Juan de Fuca, while not currently listed by ESA, are considered to be at critical or depressed levels. However, the importance of the nearshore is not restricted to chum and chinook salmon alone. All salmon species must migrate through

the nearshore, both as juveniles heading to sea and as adults returning to spawn. Hence, the nearshore within the salmon recovery jurisdiction of HCCC and NOP supports multiple species and stocks of Pacific salmon that originate not only from watersheds within the Hood Canal-Straits-Pacific single geographic unit, but also from outside this area. We also know that the nearshore within this geographic unit supports the life history of forage ~~bait~~ fish species such as surf smelt (*Hypomesus pretiosus*), sand lance (*Ammodytes hexapterus*), and herring (*Clupea harengus*) that are critical prey for Pacific salmon. In addition, numerous other marine fish species are presently under consideration for ESA listing.

Historically, the paradigm was that juvenile salmon could be found in nearshore environments during what has commonly been called the "fish window" from approximately April through September. Recent evidence from nearshore beach seining surveys suggests, however, that juvenile salmon can be found within the matrix of nearshore habitats (e.g., eelgrass beds, mudflats, marshes and channels) year-round. Thus, the nearshore is increasingly recognized as a critical, year-round component of Pacific salmon life histories. Furthermore, restoration work in a specific watershed may be wasted if the estuary for that watershed is disconnected or dysfunctional.

The need for protecting, restoring, and assessing nearshore ecosystems is magnified by projected exponential population growth along Washington State's shorelines over the next century (People for Puget Sound 1997, Broadhurst 1998). The Puget Sound Basin's population growth is expected to increase by 1.1 million people by the year 2010. It is well documented that the survival of Pacific salmon has been severely depressed in developed estuaries, relative to less disturbed estuaries. Within the single geographic unit that encompasses Hood Canal, the Straits of Juan de Fuca, and the Pacific Coast to the Hoh River, we have, perhaps, better opportunities for protecting intact nearshore ecosystems and restoring or assessing dysfunctional ones than in many of the more urbanized areas of Washington State.

In summary, we propose that all of the nearshore should be considered for assessment, protection, and restoration for the following reasons:

- The pressing need for protecting and restoring ecological connectivity at the landscape scale;
- ESA-listed species, such as juvenile chum and chinook salmon, are dependent on nearshore ecosystems;
- Nearshore ecosystems provide critical habitat for an array of forage fish species upon which Pacific salmon depend
- Mounting evidence suggests that juvenile Pacific salmon can be found in nearshore ecosystems year-round;
- Restoration work in a watershed may be wasted if the estuary/nearshore ecosystem is disconnected from the watershed or dysfunctional; and
- Washington State's shorelines are under increasing pressure from population growth and associated development, and thus nearshore ecosystems and the

ecological process and functions they provide in support of salmon are at increasing risk.

Shared Framework Development Process for the HCCC & NOP Nearshore

To improve coordination, nearshore experts from the HCCC and NOP created a process through which we would develop our Shared Framework for the nearshore (Figure 1). The first step was to identify and, subsequently, justify the level of priority assigned to the nearshore. Each function that salmonids perform within the nearshore and the physical and biological processes upon which they depend was then explicitly described. These functional and process descriptions were then incorporated into the description of each habitat type. Using our current knowledge of the natural and human stressors to the salmonid functions and processes within each habitat, a generic list of preferred project types was developed. Preferred project types and habitat limiting factor information was used to develop list(s) of activities and/or concepts for HCCC and NOP nearshore. Prioritization of the list required the application of a select group of evaluation concepts, which matched the watershed project prioritization criteria with a few exceptions

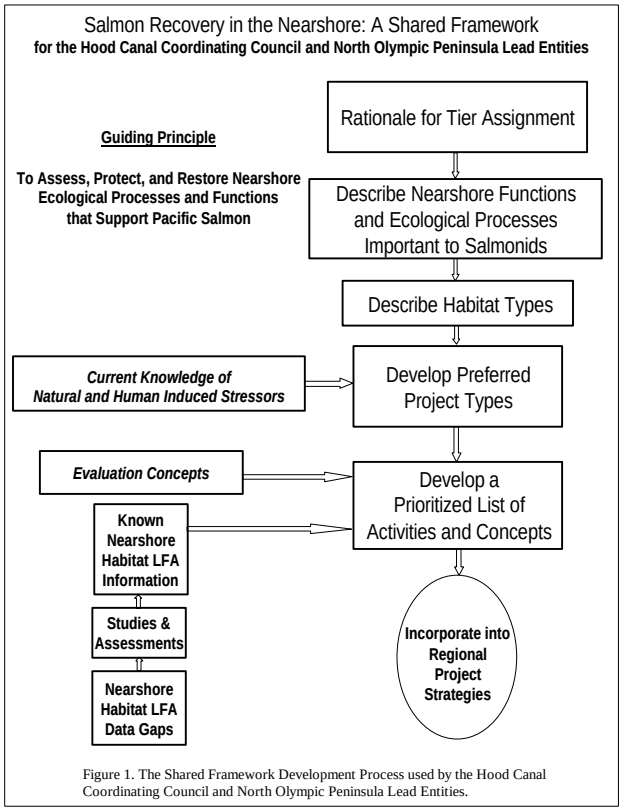


Figure 1. The Shared Framework Development Process used by the Hood Canal Coordinating Council and North Olympic Peninsula Lead Entities.

Rationale for Designation of Nearshore as Tier 1 Priority

The NOP and HCCC prioritize their geographical units into tiers based upon salmon stock-support criteria, and in the case of the NOP, productivity, diversity, and other criteria. Applying the productivity, stock-support, and diversity criteria to the nearshore environment as a whole, or as any conceivable sub-divisions, places the nearshore into Tier 1.

Nearshore Primary Functions in Support of Salmon

Nearshore ecosystems provide the following primary functions in support of juvenile Pacific salmon:

- feeding
- rearing
- migrating (including physiological changes required for osmoregulation)

Nearshore ecosystems provide the following primary functions in support of adult Pacific salmon:

- feeding
- migrating

Looking beyond this salmon-centric view, when estuarine and nearshore habitats are lost or degraded so are the array of critical functions that they provide (Simenstad and Thom 1992):

- groundwater recharge and flood desynchronization,
- sediment retention and other mechanisms of shoreline erosion control,
- water quality improvement,
- trophic energy (food web) support,
- fish and wildlife habitat,
- recreation, resource harvest,
- energy (physical) sources,
- education and science,
- aesthetic appreciation,
- promotion of biodiversity, and maintenance of microhabitat characteristics.

Nearshore Ecological Processes important to Primary Salmonid Functions

The HCCC and the NOP have identified the following nearshore ecological processes that are important to the function of these systems and, ultimately, to juvenile and/or adult salmon habitat.

- Primary productivity
- Secondary productivity
- Organic matter flow
- Nutrient cycling
- Sediment processes (erosion, transport, deposition, storage)
- Hydraulic processes (tides, currents, shoreline erosion, sedimentation, etc.).

Primary productivity refers to production by plants. This process results in organic compounds that supply energy for the food web. Primary productivity is driven by light and is dependent on sources of inorganic nutrients such as nitrate and phosphate. Many of the animals upon which the juvenile salmon feed, including insects and benthic and planktonic estuarine and nearshore invertebrates, are direct consumers of live plant

material. Alteration of the type, abundance, or productivity rates of plants in the estuary and nearshore can affect the types and amounts of prey resources available to salmon.

Secondary productivity refers to the growth of primary consumers in the system. As mentioned above, there are a number of primary consumers important to salmon. Alteration of the primary producers or direct degradation of the conditions that support secondary producers could affect salmon feeding and growth. Secondary producers can also include detritivores. Direct impacts could be from increased water temperatures, very low dissolved oxygen levels in the water, changes in current speeds or wave energies, and alteration of benthic sediment conditions (e.g., changes from soft sediment to rock).

Organic matter flow refers to the movement of plant and animal material (live, decaying or dead) among locations within the system. Of direct importance to young salmon is the use of organic matter by their prey resource species. For example, some harpacticoid copepods and amphipods are highly important to juvenile salmon in estuaries and the nearshore zone. Some of these species feed on detritus. If currents, or wave energies or substrata conditions are changed, the location and dynamics of organic matter supply and deposition can change, thus affecting the production of prey resources for salmon.

Nutrient cycling involves the processes of synthesis and breakdown of organic nitrogen and other nutrients. Nutrients are required for primary producers, which in turn fuel prey resources fed upon by young salmon. An interruption of the nutrient cycling process can affect the production of prey. Interruption or degradation of the process can occur through alteration in organic matter flow, alteration in primary productivity, and secondary productivity. Changes in climatic conditions can also affect the rate of nutrient cycling.

Sediment processes include the erosion, transport, deposition, and storage of sediments. Maintenance of appropriate substrata for prey resource production was cited as important to young salmon. Longshore currents transport sediments from the source area of a drift cell, where sediments erode, to the terminus, where sediments are deposited. High-energy storm waves, particularly in winter, lower the beach profile by moving sediment to storage in offshore bars. Variations in wave direction, energy, and current as well as the physical interruption of sediment transport can alter sediment volume and composition (Downing 1983). Activities that disrupt the equilibrium of the sediment budget in a drift cell or lower the beach profile through increased movement of sediment offshore can diminish habitat conditions for prey species.

Hydraulic processes refer to the movement of water. In estuaries and the nearshore zone, principal hydraulic processes include tides, waves, and currents, which may increase in intensity during storm events. Aside from affecting the distribution and rate of sediment movement, currents and waves during storm events can result in drastic and rapid shifts in the composition of the sediments. Hydraulic processes can be altered in ways that affect beach conditions that are important to salmon. A prominent example in Puget Sound is the effect of armoring shorelines on the hydrodynamics of an area and

subsequent effects on the rates of sediment processes. Depending on site conditions, armoring can: a.) Prevent erosion at the source of sediment, b.) Increase wave energy and erosion in adjacent areas, c.) Limit sediment transport by blocking longshore currents, d.) Change rates and locations of sediment deposition and storage, or e.) Lower beach profiles by increasing the reflected energy of waves on the beach (Downing 1983).

Critical Nearshore Habitats

Williams and Thom (2001) describe the critical habitats of nearshore and estuarine systems. Their descriptions follow.

> Washington state marine shorelines can be grouped into three distinct regions: the shores of the inland coastal waters of Puget Sound and the Strait of Juan de Fuca (2246 mi); the outer coast fronting the Pacific Ocean (171 mi); and the shores of outer coast estuaries (313 mi) (Hagen 1958). Estuarine and nearshore marine habitats can take many forms, including eelgrass (especially *Zostera marina*) meadows, kelp forests, sand and mudflats, tidal marshes and channels, river mouths and deltas, sand spits, beach and backshore areas, banks and bluffs, and marine riparian areas (Figure 2). These habitats perform a variety of important functions within an ecosystem and play a critical role in the life history and ecology of commercially and ecologically important resources in the region. A classification system for these habitat types in Washington State was developed by Dethier (1990) and largely corresponds to locally prevalent physical processes, such as wave energy, depth, tidal elevation, substratum type, and several modifiers. For each combination of these physical variables, plant and animal species diagnostic of these habitats are described, based on surveys from around the state.

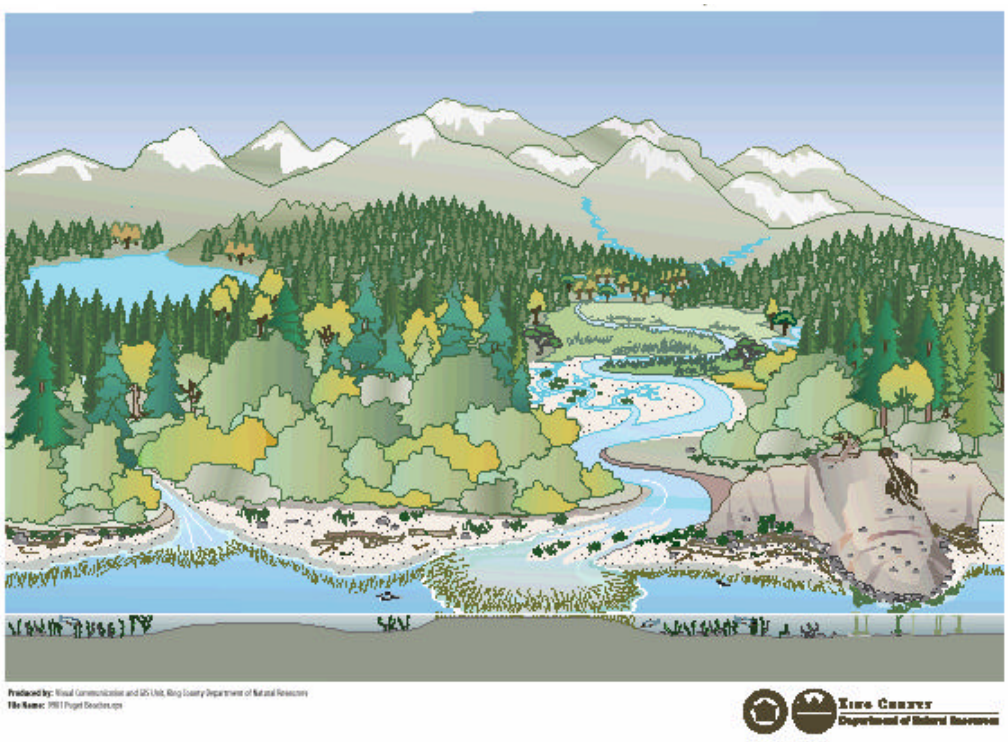


Figure 2. Illustrated are examples of many nearshore habitats including eelgrass, bull kelp, flats & beaches, tidal marshes, banks & bluffs, and marine riparian areas. Sand spits and backshore areas are not shown.

Eelgrass - Eelgrass is an example of a regional resource that provides a number of widely recognized and valued functions, including primary production, nutrient processing, wave and current energy buffering, organic matter input, habitat for fish and invertebrates, and food for birds (Phillips 1984). Eelgrass forms small patches to large meadows in the low intertidal and shallow subtidal zone in both estuaries and protected nearshore marine habitats. Its productivity can equal or exceed the productivity rates of most other aquatic plants, with rates reported in the Pacific Northwest ranging from 200-806 g C m^{-2} yr^{-1} (Thom 1984, Kentula and McIntire 1986, Thom 1990). Organic carbon produced by eelgrass can enter the food web through the microbial decomposition and processing of both particulate and dissolved eelgrass materials. This organic matter has been shown to be incorporated in the diet of fish and other marine animals including juvenile salmon (Simenstad et al. 1988). There is a rich epiphytic flora and associated small invertebrate fauna that forms seasonally on eelgrass leaves. As well, juvenile salmonids may use eelgrass for feeding and rearing, and herring (*Clupea harengus pallasi*) use eelgrass as a spawning substrate.

Bull Kelp - Bull kelp (*Nereocystis luetkeana* (Mertens) P. & R.) is a brown alga that forms small patches to large forests in the shallow subtidal zone in Puget

Sound and contributes important primary production to pelagic and nearshore food webs. Its complex structure also provides refuge and feeding habitat for fishes (especially rockfishes; West et al. 1995, Buckley 1997, Shaffer 2000), spawning substrate for herring, and buffering of wave and current energy (Duggins 1980, Harrold et al. 1988, Jackson and Winant 1983).

Flats, Sand Spits, Beaches, and Backshore Habitats - Flats, sand spits, beaches, and backshore habitats (such as lagoons) are generally comprised of gentle slopes with a mixture of substrate. The substrate may contain mud (substrata <0.06 mm diameter, usually mixed with organics), sand (0.06-4 mm), gravel (pebbles 4-64 mm)), and/or cobble (rocks between 64 mm - 256 mm) (Dethier 1990). Sand and mudflats provide a number of functions, including primary production (primarily by microalgae such as diatoms); nutrient cycling; prey production for juvenile salmon, flatfish, and birds; and bivalve production. Juvenile salmon prey species (e.g., harpacticoid copepods) have been shown to be seasonally abundant on flats and their distribution is linked to benthic microalgal abundances (Thom et al. 1989). A number of fishes, including forage fish such as surf smelt (*Hypomesus pretiosus)* and Pacific sand lance (*Ammodytes hexapterus*) (Pentilla 1995) spawn on mixed sand-gravel beaches in Puget Sound (Lemberg et al. 1997). Shorebirds are commonly observed feeding on invertebrates produced on flats in the Pacific Northwest (Herman and Bulger 1981). Two taxa of seaweed, *Ulva* spp. and *Fucus gardneri*, predominate on beaches in the region either attached to more stable rocks (primarily *Fucus gardner*) or free-floating in viable patches deposited along the beach (*Ulva* spp.). Production rates by seaweeds on cobble shorelines can be as high as eelgrass meadows (Thom et al. 1984). Bivalve production is often high on cobble and gravel beaches where adequate organic matter deposition occurs. Large woody debris (LWD) may accumulate in backshore areas and beaches at extreme high tides, and can help stabilize the shoreline (Zelo and Shipman 2000, Macdonald et al. 1994). Although not well documented in marine systems, LWD provides structurally complex roosting, nesting, refuge, and foraging opportunities for wildlife; foraging, refuge, and spawning substrate for fishes; and foraging, refuge, spawning, and attachment substrate for aquatic invertebrates (Brennan and Culverwell, In Prep). Logs imbedded in beaches also provide a source of organic matter, moisture, and nutrients that assist in the establishment and maintenance of dune and marsh plants.

Tidal Marshes and Channels – Tidally inundated vegetated marsh areas are either directly connected to or predominantly isolated from watershed sediment processes and freshwater flows. General tidal marsh functions encompass those commonly listed for wetlands, which include: primary production, fish and wildlife support, groundwater recharge, nutrient cycling, flood attenuation, and water quality improvement (Simenstad 1983). Many species of plants can be found within these marsh areas. For example, Lyngby's sedge (*Carex lyngbyei*), Salt grass (*Distichlis spicata*), Baltic rush (*Juncus balticus*), American three-square bulrush (*Scirpus americanus*), maritime bulrush (*S. maritimus*), arrowgrass

(*Triglochin maritimum*), tufted hairgrass (*Deschampsia caepitosa*), pickleweed (*Salicornia virginica*), Pacific silverweed (*Potentilla pacifica*), red fescue (*Festuca rubra*), and the common reed (*Phragmites* sp.) (Simenstad 1983, Simenstad et al. 1991a, Dethier 1990). Primary production rates for regional tidal marshes range from 529 to1,108 g C m^{-2} yr^{-1} (Thom 1981). Juvenile salmon have been shown to reside in both tidal marshes and channels and exhibit substantial growth while foraging on prey resources both produced in, and imported to, the marsh system (Shreffler et al. 1992, Simenstad and Cordell 2000). Tidal channels are used extensively by chinook, chum, and in some systems coho.

Banks, Bluffs, and Cliffs – Banks, bluffs, and cliffs are areas located between the intertidal zone and the upland. Bluffs and cliffs are steeply sloping, while banks are lower in elevation and moderate in slope. Bluffs are comprised of unconsolidated sediments of varying grain sizes and are typically more easily eroded than cliffs, which are comprised of bedrock. Nearshore areas nourished by bluffs of unconsolidated sediment are more likely to be supplied by sediment volumes and grain sizes appropriate for prey species habitat than are those downdrift of bedrock cliffs. While not extensively studied, the functions performed by banks, bluffs, and cliffs include providing protection to uplands, sediment supply to beaches (Macdonald et al. 1994), habitat for bluff-dwelling animals (including nesting birds), soils for marine riparian habitats, and groundwater supply into estuarine and marine waters. These habitats are dominated by the dynamics of several factors including geologic composition, wave energy, groundwater and surface runoff, and stabilizing vegetative cover (Macdonald et al. 1994, Myers 1993, Manashe 1993, Downing 1983).

Marine Riparian Habitats - Marine riparian habitats occur at the interface between terrestrial and aquatic ecosystems. They are characterized by dense vegetation that may include Sitka spruce (*Picea sitchensis*), willow (*Salix* spp.), red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), roses (*Rosa* spp.), and Douglas spirea (*Spirea douglasii*) (Simenstad et al. 1991a, Battelle et al. in review). Riparian vegetation affects the quality of aquatic habitats by increasing slope stability, providing erosion protection (Myers 1993, Manashe 1993, Broadhurst 1998), and buffering against pollution and sediment runoff (Federal Interagency Stream Restoration Working Group 1998). Marine riparian vegetation also performs a number of increasingly recognized habitat functions at the interface between aquatic and terrestrial zones (Brennan and Culverwell in prep). For example, overhanging riparian vegetation provides shading that regulates microclimates important to intertidal invertebrate distribution (Foster et al. 1986) and surf smelt spawning (Pentilla 2000). Vegetated riparian zones deliver organic matter and invertebrate prey to the nearshore (Simenstad and Cordell 2000), and create complex structure that is important for fish (e.g., refuge and spawning) and wildlife (e.g., bird nesting and roosting) (Battelle et al. in review).

Stressors to Nearshore Ecosystems

Both natural and anthropogenic stressors can impact nearshore processes. Natural stressors operate on a time scale of decades or longer, in comparison to days to years for anthropogenic stressors.

Natural stressors include:

- Upwelling
- El Nino/Southern Oscillation (ENSO)
- Pacific decadal oscillation (PDO)
- Earthquakes, tsunamis, and other natural disturbances

A wide variety of anthropogenic (human-induced) stressors impact the nearshore within our respective lead entity regions. Excessive human-induced stressors (or activities) alter nearshore processes and fish populations in a variety of ways (Figure 3). In turn, human-induced alterations of the nearshore have a cascading impact on the ecology, economy, and social structure of the environment within which we live.

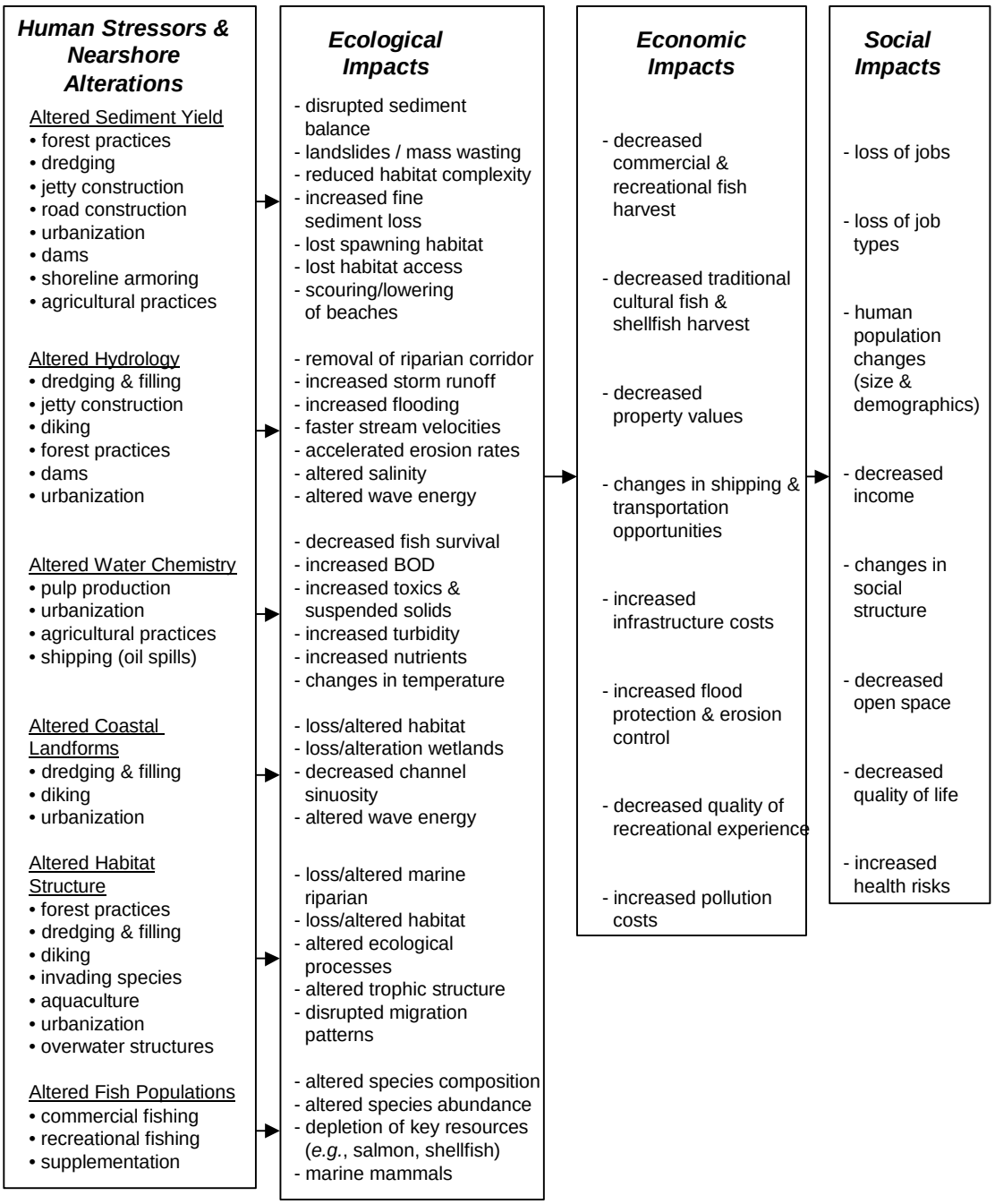


Figure 3. The impacts of human stressors in the nearshore on the ecology, economy, and social structure of the environment within which we live. Impacts from global warming and associated sea-level rise, while important, are not included within this figure.

Preferred Types of Nearshore Projects

Preferred Project Types must be linked to the ecological processes and functions and the stressors impacting the ecosystem. The actions taken must be relevant to the stressors on the system that support the fish or on the fish directly. A conceptual model (Figure 4), adapted from Williams and Thom, 2001, illustrates the general connection between stressors and ecological processes and functions; shoreline armoring is offered as one example. We note, however, that this is a simplified model and that there are multiple feedback loops not shown. This simplified model indicates that ecological functions are dependent on the structure and processes associated with the habitats in the ecosystem, and that the structure is a result of a multitude of physical processes such as hydrology, climate, etc. In turn, the effects of stressors caused by human alterations of these physical processes can have a ripple effect throughout the system that results in an ultimate impact on the function of a system for salmon. Human alterations of various physical processes are often represented in the literature as limiting factors. The stronger the understanding of the linkages among components of this model, the better our understanding of what needs to be restored or protected. Assessments and studies, designed to improve our understanding of these linkages, are needed to focus our project efforts.

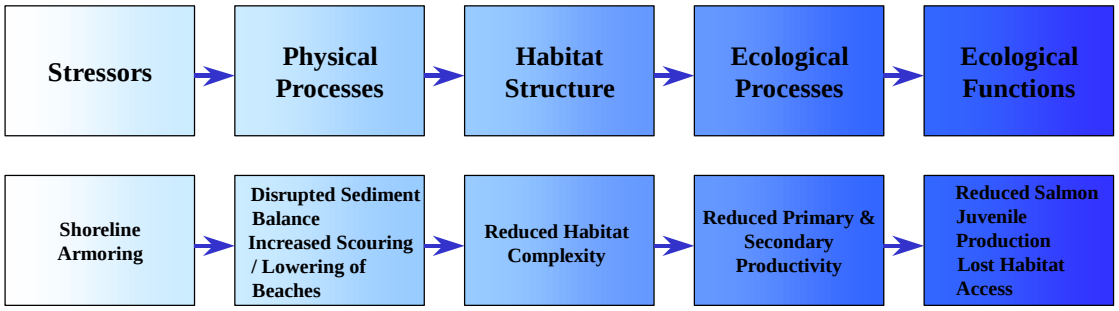


Figure 4. Conceptual model of linkages between stressors and ecological functions with shoreline armoring as one example

Preferred project types, for the recovery of salmon habitat in the nearshore, include assessments, protection, and restoration projects.

Assessments and Studies:

- Assessments and studies that will lead to habitat protection and/or restoration projects.
- Refugia studies

Protection Projects:

- Property Acquisition, for protection and/or for implementation of critical restoration measures. Property acquisition will be in the form of a fee-simple purchase or perpetual conservation easement.

  Note: All Property Acquisition proposals should provide for the perpetual protection and/or restoration of critical habitat structure and ecological processes and functions.

Restoration Projects - that address the cause (i.e., stressors), not the symptom (e.g., dysfunctional habitat structure) of the problem:

- Restore natural stream channel morphology and sinuosity in tidally influenced reaches
- Restore the natural tidal channels and tidal prism
- Remove shoreline modifications (e.g., levees, bulkheads, rip-rap, piers, pilings, over-water structures) and restore natural beach functions
- Remove or alter tide gates to restore tidal inundation and fish access
- Remove fills from historical habitat
- Restore vegetated habitats (*e.g.*, eelgrass, salt marsh, marine riparian, kelp)
- Restore historic sediment sources (*e.g.*, dam removal, bulkheads)
- Implement non-point and point source control of contaminants and toxics

Nearshore "Project" Evaluation Concepts:

The following set of evaluation concepts should be used when developing the Prioritized Lists of Activities and/or Concepts for the nearshore:

Ecologically Based Concepts:

- Proximity to Productive Stocks and/or Priority Watersheds - What is the proximity of the nearshore habitat to productive stocks and/or priority watersheds? (Refer to the tiered watershed priorities for guidance.) *
- Support for Migrating Stocks – Does this activity and/or concept support stocks or populations from outside of the area that potentially utilize our extensive nearshore as migratory corridors? *
- Ecological Connectivity – Will this activity and/or concept improve ecological connectivity (*i.e.*, biological, chemical, and/or physical) within the ecosystem?
- Scale – Is the benefit (*i.e.*, spatial, temporal, and/or biological) of the activity and/or concept appropriate for the degree of impairment to the habitat structure or ecological processes or functions? Biological scale includes

stocks, populations, life histories, components, etc. Human Induced Threats – Does the activity and/or concept address the threats to the habitat structure, ecological process, or functions?

- Natural Threats – Does this activity and/or concept interrupt the natural ecological processes or functions? What are the natural vulnerability or risks, associated with the habitat structure or ecological processes or functions in need of protection and/or restoration, including risks inherent with low population numbers?
- Appropriate Time Frame – Does the project address the cause of the problem within an appropriate time frame?

* Used for the evaluation of nearshore activities and/or concepts only.

Feasibility Based Concepts:

- Technical Feasibility – Is the activity and/or concept technically feasible?
- Certainty of Success - What is the certainty of success associated with the activity and/or concept?
- Appropriate Project Costs – Are the project costs appropriate for the activity and/or concept?
- Opportunity – Will the opportunity be lost if we don't act now?
- Self-Maintenance – Will the activity or concept result in an ecosystem that is structurally and functionally persistent, without the need for long-term human maintenance or manipulations?

List of Activities and Concepts for the Nearshore

The NOP List of Activities and Concepts for the nearshore was developed from:

- Salmon and Steelhead Habitat Limiting Factors documents for WRIA's 18, 19, and 20 (Haring,1999; Smith, 2000 A; Smith, 2000 B)
- Summer Chum Salmon Conservation Initiative (Ames et. al, 2000), and
- Project ideas submitted by NOPLE members.

The reader should refer to Appendix E within this Project Strategy for a list of the major limiting factors in the NOP nearshore.

Prioritization of the NOPLE List of Activities and Concepts for the nearshore will be completed for the next Strategy version and coordinated with work being conducted by the Clallam County Marine Resource Committee and other entities. Our nearshore efforts will also be coordinated with the joint Geographic Information System (GIS) work between the NOP and the HCCC lead entities.

Final Priority No.	WRIA	E or W	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Category (Restoration, Protection, Assessment-Broad, Assessment-Targeted, Management)	What fish stocks and/or populations will benefit?
	17		Pit Ship Point Salt Marsh Restoration	Replace undersized culvert to restore salt marsh.	Nearshore Processes	Summer Chum Salmon Conservation Initiative April 2000, Pages 263-264	Restoration	multiple stocks (e.g., ESJF & HC Summer chum, Puget Sound Chinook)
	18	E & W	WRIA 18 Shoreline Armoring Effects: Assessment	Evaluate the effects of shoreline armoring on shoreline sediment transport and nearshore sediment composition (in WRIA 18 areas not specifically addressed by this list).	Nearshore Processes	WRIA 18 LFA, Pages 163-171	Assessment - Broad	All species
	18	W	Port Angeles Harbor: Modification of Log-Booming Practices	Modify log-booming practices in Port Angeles harbor to eliminate the accumulation of wood debris on the bottom of the harbor, and restore subtidal substrate conditions that are affecting dissolved oxygen in the waters of the harbor and benthic production in areas affected by accumulations of wood waste.	Nearshore Processes	WRIA 18 LFA, Pages 163-171	Management	All species
	18	E	Graysmarsh / Gierin Creek Protection Project	Acquire or obtain conservation easements to maintain the integrity of Graysmarsh, which functions as an important salmonid rearing area, and to maintain the potential to restore the are to tidal saltmarsh.	Estuarine Processes	WRIA 18 LFA, Page 177	Protection	All species
	18	E	Washington Harbor Protection Project	Acquire or purchase easements on property in and immediately adjacent to Washington Harbor. This estuary has long been recongnized as providing very high quality fish and wildlife habitat and must be protected.	Estuarine Processes	WRIA 18 LFA, Page 177	Protection	All species
	18	E	Meadowbrook Creek Saltmarsh / Estuary Protection Project	Provide protection for wetlands in lower Meadowbrook Creek to prevent further encroachment on this saltmarsh / estuarine habitat by development or more intensive agriculture.	Estuarine Processes	WRIA 18 LFA, Page 177	Protection	All species
	18	E	Dungeness Estuary Restoration	Develop and implement a strategy to restore estuarine functions and habitat	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 107	Restoration	All species
	18	E	Dungeness Bay to Washington Harbor: Elimination of Point and Non-Point Nutrients Sources	Conduct a comprehensive and regular assessment of eelgrass and Ulva presence where increasing Ulva presence is documented. This study should look not only at the conversion area, but also the local conditions that appear to favor conversion to Ulva. Minimize the growth of *Ulva* (spp) by eliminating point and non-point source nutrient delivery to the Dungeness Bay to Jamestown Shoreline, a shallow embayment with limited tidal flushing. Ulvoid mats may be replacing critical eelgrass habitat in this bay. See the Dungeness Bay: Eelgrass to Ulva Assessment Project.	Water Quality	WRIA 18 LFA, Pages 163-171; Shaffer (*In-Press)*	Restoration	All species
	18	W	Morse Creek Estuary Restoration	Restore estuarine characteristics and function similar to historic conditions.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 133-135	Restoration	chinook, coho, pink, chum, WSH, SSH
	18	W	Elwha River Estuary Restoration	Removal of various channel restrictions, including the 500' Place Road dike on the west side of the estuary. Dam removal alone will not restore the rivers ecosystem. Restoration actions, being developed by the Lower Elwha Tribe in the lower part of the river, must be completed to prepare the river for dam removal.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 160-162	Restoration	chinook, coho, pink, chum, SSH, WSH
	18	W	Elwha to Ediz Hook Shoreline Sediment Transport Assessment and Restoration	Assess and restore shoreline sediment transport from the Elwha River and the feeder bluff between the Elwha River and the west end of Ediz Hook.	Nearshore Processes	WRIA 18 LFA, Pages 163-171, 181	Restoration	All species
	18	W	Ediz Hook to Morse Creek Littoral Drift Assessment and Restoration	Assess and restore the littoral drift from marine bluffs to the west of Morse Creek.	Nearshore Processes	WRIA 18 LFA, Pages 163-171, 181	Restoration	All species
	18	E	Cassalery Creek Estuary Restoration	Develop and implement a strategy for restoring estuarine processes and fish passage in Cassalery Creek, including culvert removal.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 83	Restoration	coho, chum, WSH
	18	E	Washington Harbor Tidal Flow Restoration	Restore unrestricted tidal flow and flushing to the north end of Washington Harbor.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Pages 163-171	Restoration	All species

Final Priority No.	WRIA	E or W	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Category (Restoration, Protection, Assessment-Broad, Assessment-Targeted, Management)	What fish stocks and/or populations will benefit?
	18	W	Ennis Creek Estuary Restoration	Restore the intertidal estuary once the cleanup of the Rayonier Mill site is complete.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 141-142	Restoration	chinook, coho, chum, WSH
	18	W	Rayonier Pier Removal or Reconfiguration	Remove or reconfigure the Rayonier pier to provide unrestricted nearshore salmonid migration and longshore sediment transport.	Access / Connectivity	WRIA 18 LFA, Pages 163-171	Restoration	All species
	18	W	Peabody Creek Estuary Restoration	Remove lower culverts and retrofit stormwater system on creek. Restore the intertidal area.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 144	Restoration	coho
	18	E	Graysmarsh Saltmarsh Restoration	Pursue restoration of saltmarsh habitat in the estuary, including returning Gierin Creek to its former meandering location, which essentially bisected the marsh.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 80	Restoration	coho, chum, WSH
	18	E	Bell Creek & Estuary Re-Integration	Restore the lower, channelized reach of Bell Creek (downstream of Schmuck Road) and properly integrate with the estuary. Restoration must included removal of dikes, meandering of the channel, excavation of pools, and additions of LWD.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 77	Restoration	coho, chum, WSH
	18	E	Cooper Creek Estuary Restoration	Modify the tidegate to allow significantly greater tidal flux into the Cooper Creek estuary. Modify or remove the water level control structure in the estuary to allow unimpeded fish passage.	Access / Connectivity, Estuarine Processes	WRIA 18 LFA, Page 85	Restoration	coho, WSH
	18	W	Tumwater Creek Estuary Restoration	Restore functional estuary and watershed processes.	Estuarine Processes	WRIA 18 LFA, Page 150	Restoration	coho, chum, WSH
	18 & 19		Nearshore Restoration for Salmon Recovery: Assessment & Project Prioritization	To comprehensively compile existing marine habitat and resource use information specific to ESA listed species, map areas of historic and current importance, and if relevant, combine identified limiting factors process with priority areas to define a prioritized action list for salmon recovery. This would include specific restoration/preservation projects in WRIA's 18 and 19.	Nearshore Processes		Assessment - Broad	various
	18 & 19		Low DO as a Limiting Factor in Salmonid Migration in the Nearshore of the Strait of Juan de Fuca	To perform a data analysis to establish a link between observed seasonal, natural low dissolved oxygen intrusions and the success and timing of salmonid migration in the Strait of Juan de Fuca and its nearshore waters.	Nearshore Processes	Shea et al (1981), Callaway et al. (1965)	Assessment - Broad	various
	19		WRIA 19 Understory Kelp Assessment	Inventory understory kelp habitat along the entire WRIA 19 nearshore.	Nearshore Processes	WRIA 19, Page 88	Assessment - Broad	various
	19		WRIA 19 Eelgrass & Kelp Habitat Use Assessment	Assess elements of differntial use of eelgrass, overstory and understory kelp habitat by salmon.	Nearshore Processes	WRIA 19, Page 88	Assessment - Broad	various
	19		WRIA 19 Forage Fish Survey	Identify and assess the forage fish spawning areas throughout WRIA 19.	Nearshore Processes	WRIA 19, Page 88	Assessment - Broad	various
	19		WRIA 19 Estuarine Sediment Deposition Assessment	Conduct studies, across WRIA 19, to determine the effect of estuarine sediment deposition on salmon production.	Nearshore Processes	WRIA 19, Page 88	Assessment - Broad	various
	19		Hoko River Estuary and Mouth Sediment Impact Assessment	Assess the impact of sediment from upstream forestry practices on the Hoko River.	Nearshore Processes	WRIA 19, Page 86	Assessment - Targeted	various
	19		Clallam River Estuary Restoration Assessment	Conduct an assessment that would determine a course of action to restore the Clallam River estuary.	Access / Connectivity / Estuarine Processes	WRIA 19, Page 86	Assessment - Targeted	various
	19		Twin Rivers Nearshore Nearshore Restoration	Eliminate gravel removal from beaches near the Twin Rivers.	Nearshore Processes	WRIA 19 LFA, Page 83	Management	various
	19		Lyre River Forage Fish Spawning Area Conservation	Develop a plan to protect the surf smelt spawning area just west of the Lyre River.	Nearshore Processes	WRIA 19, Page 83	Protection	various
	19		Pysht Estuary Protection and Restoration Project	Protect and restore (road removal & dredge spoils) the estuary from further harm from forestry practices and allow it to recover.	Estuarine Processes	WRIA 19 LFA, Page 85	Protection	various
	19		Sail River Estuary Protection	Eliminate, reduce, or minimize dredging within the Sail River estuary.	Estuarine Processes	WRIA 19, Page 88	Protection	various
	19		WRIA 19 Eelgrass Assessment and Protection	Develop a plan to protect the eelgrass beds in this area, particularly from high sediment loads from logging practices. These beds are heavily used by chinook and coho.	Nearshore Processes	WRIA 19 LFA, Page 81, 85, 86, & 88	Protection	various
	19		WRIA 19 Kelp Assessment and Protection	Develop a plan to protect the kelp beds in this area, particularly from high sediment loads from logging practices. These beds are heavily used by chinook and coho.	Nearshore Processes	WRIA 19 LFA, Page 81, 85, 86, & 89	Protection	various

Final Priority No.	WRIA	E or W	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Category (Restoration, Protection, Assessment-Broad, Assessment-Targeted, Management)	What fish stocks and/or populations will benefit?
	19		Salt Creek Salt Marsh Reconnection	Restore the connection between the 15 salt marsh and the tidal-influenced reaches of Salt Creek that was disconnected by a dike/road.	Access / Connectivity, Estuarine Processes	WRIA 19 LFA, Page 81	Restoration	coho, chum, chinook
	19		Whiskey Creek Nearshore Restoration	Remove bulkheads constructed near Whiskey Creek, as well as sedimentation from forestry-related practices. Sedimentation has likely affected eelgrass quantities. A surf smelt spawning area may be impacted by this activity.	Nearshore Processes	WRIA 19 LFA, Page 82	Restoration	various
	19		Twin Rivers Nearshore Restoration	Reduce sedimentation to eelgrass habitat near the Twin Rivers. Excess sediment sources include forestry practices, a Hwy 112 landslide, and nearby mining and dredging operations.	Nearshore Processes	WRIA 19 LFA, Page 83	Restoration	various
	19		Deep Creek Sediment Reduction Project	Reduce debris flows to minimize sources of excess sediment. Protect the nearby surf smelt spawning area east of Deep Creek.	Nearshore Processes	WRIA 19 LFA, Page 83	Restoration	various
	19		Jim and Joe Creek Estuary Restoration	Restore the mouth of Jim and Joe creeks by reducing sediment transport to estuary and improving forestry practices to minimize sediment sources. Remove two breakwaters near the mouth of Jim Creek and discontinue dredging at this location.	Estuarine Processes	WRIA 19 LFA, Page 85	Restoration	various
	19		Highway 112 Sediment Source Reduction	Reduce sediment impacts from Highway 112 to the nearshore environment.	Nearshore Processes	WRIA 19, Page 88	Restoration	various
	19		Crescent Bay Non-Point Pollution Reduction	Develop and implement a plan to minimize non-point source pollution to the nearshore in this area.	Water Quality	WRIA 19, Page 88	Restoration	various
	20		WRIA 20 Sediment Transport: An Assessment of Estuarine Impacts	Assess the impacts of sediment transport on the estuaries in WRIA 20. Develop a plan to reduce sediment input to estuarine habitat.	Nearshore Processes	WRIA 20, Page 100	Assessment - Broad	various
	20		WRIA 20 Sediment Transport: An Assessment of Kelp Bed Impacts	Assess the impacts of sediment transport to kelp beds in WRIA 20. Develop a plan to reduce sediment input to kelp bed habitat.	Nearshore Processes	WRIA 20, Page 129	Assessment - Broad	various
	20		WRIA 20 Estuarine and Nearshore Water Quality Assessment	Assess the impacts to water quality of the estuaries and nearshore areas within WRIA 20.	Estuarine and Nearshore Water Quality	WRIA 20, Page 100	Assessment - Broad	various
	20		WRIA 20 Toxic Algal Bloom: An Assessment of Causes	Assess the causes of toxic algal blooms in the nearshore waters of WRIA 20.	Nearshore Processes	WRIA 20, Page 129	Assessment - Broad	various
	20		WRIA 20 Estuarine Protection & Restoration Project	Develop a plan to protect and restore estuarine habitat, particularly eelgrass, from dredging, filling, contaminants, and other impacts throughout WRIA 20.	Estuarine and Nearshore Processes	WRIA 20, Page 123	Assessment - Broad	various
	20		WRIA 20 Small Estuary Assessment: Importance to Salmonids	Assess the importance to salmonids of the small estuaries in WRIA 20. Develop a plan to protect and/or restore these small estuaries.	Estuarine Processes	WRIA 20, Page 129	Assessment - Broad	various
	20		Quillayute Boat Basin Waste Dumping Assessment	Determine the impacts of waste dumping into the Quillayute Boat Basin on the estuary. Develop an action plan to address the problem, if identified.	Water Quality	WRIA 20, Page 100	Assessment - Targeted	various
	20		Quillayute River Estuary Analysis	An analysis, similar to watershed analyses, is needed for the Quillayute River estuary. The emphasis should be on sedimentation and its upland sources, as well as the effects of bank protection and dredging on salmonid habitat.	Estuarine Processes	WRIA 20, Page 99 & 129	Assessment - Targeted	various
	20		Hoh River Mouth Analysis	Quantify the impact of channel changes to the mouth of the Hoh River.	Nearshore Processes	WRIA 20, Page 101 & 129	Assessment - Targeted	various
	20		Ozette River Mouth Analysis	Quantify the impact of channel changes to the mouth of the Ozette River.	Nearshore Processes	WRIA 20, Page 102 & 129	Assessment - Targeted	various
	20		Goodman Creek Estuary Assessment and Protection Project	Assess the water quality and salmonid use of this habitat. Develop an plan to protect this unique habitat.	Estuarine Processes	WRIA 20, Page 100	Assessment - Targeted	various
	20		Rialto Beach to South Beach Surf Smelt Spawning Area Conservation	Assess the need to protect or restore the surf smelt spawning area from Rialto Beach to the area just south of the Quillayute River mouth..	Nearshore Processes	WRIA 20, Page 123	Assessment - Targeted	various
	20		WRIA 20 Kelp Conservation	Work with various entities, including the Olympic National Park and the Olympic National Marine Sanctuary, to conserve kelp beds along the WRIA 20 shoreline.	Protection	WRIA 20, Page 123	Management	various

Final Priority No.	WRIA	E or W	Project Name, Activity and/or Concept	Concise Description (If required, use an attached sheet for more detail.)	Targeted Limiting Factor(s)	Reference Citation (Limiting Factor Analyses, Watershed Analyses, Other - include page numbers)	Project Category (Restoration, Protection, Assessment-Broad, Assessment-Targeted, Management)	What fish stocks and/or populations will benefit?
	20		Columbia and Snake River Dam Removal Project	Remove the dams Columbia and Snake Rivers and various jetties along the Washington coast to allow the resupply of sediment to the Hoh River nearshore (and points south).	Nearshore Processes	WRIA 20, Page 96	Restoration	various
	20		WRIA 20 Bank Armoring Reduction Project	Reduce the amount of bank armoring in the lower reaches of the rivers and estuaries in WRIA 20.	Nearshore and Estuarine Processes	WRIA 20, Page 126	Restoration	various

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Quillayute Basin Project Prioritization Strategy

Quillayute Mainstem and Estuary; Dickey River; Sol DucRiver; Bogachiel and Calawah Rivers

Prepared summer of 2001 by Quileute Natural Resources staff.

Quileute Mainstem and Estuary

Prioritization is based on Army Corps of Engineer studies and on notations in the Limiting Factors Analysis for WRIA 20, prepared in 2000, and premised largely on watershed analyses..

Re the Corps documents: No watershed analysis has been conducted on this waterbody; however, the Army Corps of Engineers has conducted a number of assessments on the estuary, for the past 30 years, because of federal (Congressional) requirements to dredge the river mouth, a port of safe harbor. The dredging may have an impact on salmonids, which use this estuary to enter and leave the Quillayute System. Corps publications for the EIS include but are not limited to the *Quillayute River Navigation Projec: Comprehensive Study, Environmental Studies, on water quality, salmonid fish, smelt, crab, and subtidal. 1981.* These studies have just been updated in 2000-2001 by the Corps, which conducted updated habitat and fish use studies of the estuary. Because of cost limitations, they did not go past the Reservation boundary of one river mile from the mouth. Nor did they attempt to draw conclusions from their data. The electronic drafts have been disseminated to federal, tribal, and state entities but are not yet published in hard copy. In the 1990s, the Corps did extensive surveys on channel depth and created in fact a number of structures to trap sediment, with varying success. They produced a number of channel maps which have been disseminated to state, tribal, and federal agencies. None of the above studies was included in the Limiting Factors analysis for reasons unknown, possibly because of time. All Corps studies were conducted by professional engineers and/or outside contractors with expertise in the areas of study and copies of all of their material may be reviewed at the Seattle Office of the Corps, at United States Fish and Wildlife Service (USFWS) or WDFW in Olympia, or at the Quileute Tribe Natural Resources Building in LaPush.

The main thrust of the environmental study of 2001 was to reveal migration of the meanders downstream within the past 20 years, in areas where both the Olympic National Park and the Quileute Tribe will need to maintain bank structures to prevent erosion (e.g., of U.S. 101 and of Reservation buildings). The channel studies of the 1990s reveal the impact of large sediment loads being delivered to the river mouth. Dredge materials are redistributed along Rialto Beach to aid the smelt spawning.

Olympic National Park has for the past few years conducted a smelt spawning study on Rialto Beach. This is ongoing.

Limiting Factors Analysis—p. 129—states the need for an assessment similar to watershed analysis to determine impacts on sedimentation loads from upland sources, and the effects of dredging and bank protection on salmonid habitat. We submit here that to date, none of the migrating salmonid runs are listed under ESA. Therefore, neither the sedimentation nor dredging should be regarded as having a critical impact on fish at this point, but both merit continued observation.

Data gaps to be filled, include (and are prioritized in order of benefit to salmon, first)

- Assessment to determine impacts on sediment loads from upland sources, using Corps data and extrapolating from 4 watershed analyses of upstream river systems, as well as gathering new data. Determination of shallowing of channel over time, using Corps data.
- Monitor water to determine extent of the estuary above the Reservation boundary. Corps began this study but did not go beyond one river mile. Plant species and observation of tidal movement suggest salinity goes well beyond that point.
- Development of conclusions from Corps data on salmonid use.
- Engineering study of bank support projects and recommendations for methods with least impact on downstream river dynamics and on fish.

Note: The dredging is Congressionally ordered and must continue, so the studies are designed to work around this issue.

Dickey Sub-Basin

A watershed analysis under the state TFW process was conducted in 1999. Rayonier and WDNR led the multi-agency team, which included the Quileute Tribe. The Modules from this were reviewed by Dr. Carol Smith and to some extent incorporated into the Limiting Factors Analysis of 2000, which was of necessity, abbreviated. Prioritize thus:

- Fish Passage Blockages – 38 of the 73 blocked culverts in the Quillayute Basin have been identified in the Dickey system. They are ranked in the Limiting Factors Analysis (pp. 48-53) as follows: 1, 2, 5, 7, 9, 11,12,18, 19, 25, 26, 27, 32, 32, 33, 34, 34, 37, 38, 39, 40, 41, 42, 48, 49, 50, 51, 52, 54, 55,61,62,63,64,65,66,67, and 68. This is a low-gradient system with few natural blockages, which means that removal of the man-made ones will optimize the system for access to habitat. Some 10% of the Dickey is wetlands, meaning that there is excellent off-channel spawning and rearing for coho, if all is accessible. Correction of blocked passages has a high success rate. As culverts are replaced, their numbers will be removed from this list.
- Fish Distribution/Stream – Typing/ Mapping of tributaries that flow into the Dickey Mainstem. This is a data gap because this area (below the confluence of E and W forks with mainstem) was not included in the Watershed Analysis of 1998.

Consequently, little is known of the present status of fish use in tributaries to the Dickey Mainstem. Source of data gap knowledge—the Watershed Analysis and what it purports to cover—namely, the E and W forks. Also, Teresa Powell of WDFW, which last surveyed area nearly two decades ago when the means of mapping and assessment were less sophisticated. Also, the basin has been harvested extensively since then.

- Riparian Impacts – Limited hardwood conversion in areas that are exclusively hardwoods, to improve quality of LWD recruitment. [Watershed analysis of Dickey, Map D-1.] Riparian impacts occur throughout the Dickey and are worsened because of windthrow in a number of locations in harvested areas. The strong windstorms in the winter destroy the riparian buffers left after recent timber harvest in susceptible areas. Windthrow in an ongoing problem that needs to be corrected as and when discovered as it impacts stream temperature and recruitment of LWD.
- Warm Temperatures - *Water temperature surveys with hobos, in wetlands and adjacent channels, would be a priority, for the following reason.* Warm water temperatures are another "poor" habitat condition throughout the Dickey sub-basin, do to extensive harvests that after replanting, have not matured sufficiently to protect the off-channel wetlands. Watershed Analysis of 1999 discusses this under the Water Quality Module, regarding temperature of groundwater that connects the wetlands to the channels. Prescriptions: still in draft, unpublished, give lack of shade a high hazard rating; vulnerability is high, as well. Specific harvest limits in WSA.
- *Channel stability assessment*. Flooding in December, 1999 not only washed out LWD in the East Fork, but has also resulted in signs of channel instability. This would need to be surveyed and studied by engineers before prioritizing.
- Excessive Sedimentation – See p. 58 Limiting Factors. No longer a concern. Excessive sedimentation in the Dickey predominantly due to roads was noted in Sedimentation Module of WSA of 1998 and reported in the draft prescriptions. A survey was done afterward by Rayonier with Quileute, and the mainlines were determined to be the biggest source.. Cross-drains were installed in key places and the sedimentation has been greatly reduced. Rayonier has graphs of these before and after conditions.
- Low Water Flows –No recommended projects through SRFB at this time.

Sol Duc Sub-Basin

Prioritization based on restoration recommendations or hazard calls in Watershed Analysis (state and federal, with Quileute Tribe) of 1995, managed by USFS; and on Limiting Factors Analysis of 2000 for WRIA 20, which summarized the WSA. Since this watershed analysis, a series of restoration projects on riparian zones and on culverts have been completed. Other large-scale projects remain to be completed.

- Maintenance of Off-channel Habitat—prioritized as a high need in the Limiting Factors Analysis at page 56, where it is noted that the entire watershed has only 3%

wetlands, and impacts such as road construction, logging, development, and agriculture are reducing this figure. Examples are in North fork Bear Creek and East side of Lake Pleasant (riparian converted to deciduous trees), and loss of off-channel habitat in S. Fork Sol Duc and Lower Bear Creek. Concern for Camp and Kugel creek off-channel habitat loss (these are upper Sol Duc). Watershed Analysis Module on Restoration Needs and Other Opportunities, Table 3.1A on page. 3-19 through 3-24 also discusses these needs. *Acquisition and enhancement may be remedies.* Enhancement example: Two years ago, Tribe preserved man-made coho-habitat wetlands during culvert replacement, by use of careful engineering of culvert size ("1010 creek"). Partial replacement of alders with conifers needs to be assessed. In case of Lake Pleasant, some lakeside acquisition may be possible. This is area of only established sockeye spawning in Quillayute System.

- Excessive Sedimentation – *Data gaps and needs*. p. 10 of Limiting Factors—Stemming from landslides and high road densities, sedimentation contributes to high levels of fines in the tributaries, degrading quality of spawning habitat. *Possible candidate for cross-drain assessment and for engineering studies on bank reinforcement techniques.*.
- Fish Passage Blockages - Blockages are a known major problem within Gunderson and Tassel Creeks, from Limiting Factors. Because these have high likelihood of success, *culvert repairs rank above some other project types.* Tassel Creek has been corrected. Gunderson Creek has 8 culverts listed as blocked, on pages 48-53. They are #s 8, 10, 14, 20, 21, 56, 58, and 69-- of 73 in the Quillayute Basin. All have excellent fish habitat above the culverts.
- Lack of LWD—see p. 10 of Limiting Factors. The following citations are from the Watershed Analysis of 1995-6, Restoration Module, pp. 3-20 through 3-23: Shuwah Creek (recently restored--2001), Bear Creek (restored in 1997), *Bockman Creek, Maxfield Creek, Camp Creek Beaver Creek—still in need. Prior projects have restored blowdowns by installation of engineered root wads and by repairing blowdowns.* As needed, the latter is an ongoing process. It allows one to take the logs straddling the streams and put some of them in key places to shore up banks or create ponding. Others are left for future recruitment.
- Warm Water Temperatures and Low Summer Flows—possible water quality monitoring to evaluate for 303(d) list, with hobos. Has not been done for a decade. Not presently a viable topic for SRFB. Warm water temperatures are a problem in the summer, potentially impacting adult migration and spawning of summer chinook and a unique summer coho run. A large potential habitat problem is the over-allocation of water from the river. Contributing to summer low flows and warm water temperatures is the "poor" hydrologic maturity (loss of fog drip, change in hydrology) outside of the Park boundaries.
- As a footnote, WDFW is stream typing the Sol Duc, so Quileute is not recommending that for this system.

Bogachiel Sub-Basin

Except for the Calawah, no state or federal watershed analysis has been done on the Bogachiel, leading to Limiting Factors Analysis statements of data gaps. Page 126—mapping and typing of all streams and wetlands are listed as needed to ID where habitat protection is necessary. Some of these gaps are in the process of being remedied, as will be noted below. For example, Quileute has surveyed culverts and crossdrains and wetlands; is in process of surveying lower Bogachiel for fish presence; and as a conclusion from the stream-typing, will be able to develop a list of off-channel habitat projects and prioritization of same. That will be done in by September of 2001.

- Blocked fish passage/culvert replacement. In 2000 Quileute Tribe surveyed the entire Bogachiel system accessible by roads, except for the Calawah tributary system, and GIS-mapped blocked culverts, cross drains, and wetlands. 37 blocked culverts were observed. all 71 cross-drains were operative. In order to prioritize the culverts, the Tribe stream-typed the Maxfield and Murphy tributaries in the lower Bogachiel. Results of that will be known at the end of summer of 2001 and ready for project prioritization. Because of the excellent habitat above the culverts, most of these will be high priority to replace.
- Stream-typing/fish use surveys: After 2001, fish use is still a data gap, from confluence of Calawah and Bogachiel, upstream into Olympic National Park (source). All of these tributaries are badly mapped, as well, per LFA of 2000. The Bogachiel sub-basin is lacking in specific data regarding many of the habitat conditions assessed in this report. Considering the number of salmon stocks and extent of salmon production from this drainage, this is a major data need.
- Data gap re Riparian Conditions – analyze per pages 68 and 128 of Limiting Factors, as to tree species and age.
- Data gap re flood plain mapping, per page 127 of Limiting Factors Analysis. Need to map in all basins of WRIA 20. Include soil mapping and elevation measurements. The Bogachiel has proven to be a significant flood threat in the past several years, a matter which has drawn the attention of Washington Department of Ecology and the U.S. Army Corps of Engineers.
- Excessive Aggradation – not within immediate purview of SRFB projects, as attributed to roads and lack of LWD. Mainstem aggradation worsens downstream of Park.
- Warm Water Temperatures – *Water Quality Survey recommended for temperature and DO*. Monitoring not presently in purview of SRFB awards. Warm water temperatures are a documented habitat problem in the lower Bogachiel, per Limiting Factors, which relied on the 303(d) list. See p. 74 of LFA. DO is a problem as well, related to the warm temperatures. RM 0 to RM20 are cited, and RMs 8.7, 9.8, 12.6, and 15.7 are particularly emphasized. The data is not current for these 303(d) lists and a new baseline study is recommended for the entire Bogachiel below the Park, where lack of LWD is greatest. Harvests continue to occur.

Calawah Sub-Basin

Watershed analyses have been completed on the North Fork of the Calawah (1997) and on the Sitkum/South Fork of the Calawah (1998) by state and federal agencies and the Quileute Tribe. These were summarized in the Limiting Factors.

- Survey for fish passage blockages is recommended at p. 127 of Limiting Factors Analysis. WSA's did not prioritize them. As these types of projects are usually highly successful, we rank survey as a top priority.
- Bank Stabilization projects to remedy Excessive Sedimentation – p. 11 Limiting Factors. *Recommended for engineering assessment followed by restoration of unstable banks.* An extensive landslide problem exists in the sub-basin, mostly due to older roads but in some cases because of steep slopes. Side-cast roads are a particular concern, and in general high road densities are found in the South Fork Calawah and in the headwaters of the North Fork Calawah. The excessive sedimentation is thought to contribute to dewatering in Hyas Creek, the North Fork Sitkum River, and Rainbow Creek.
- Sitkum/SF Calawah WSA in Fish Habitat Module, page 2.6-31: Data Gaps and Monitoring per this WSA:
    1. for Upper Sitkum sub-watershed—survey for upper limit of resident and anadromous fish presence and use. ID LF for resident fish above segment D64
    2. L, M, U South Fork of Calawah—survey for more precise knowledge of anadromous and resident fish within Olympic National Park boundary. This area could be used as indicator of natural conditions.
    3. Sitkum and South Fork of Calawah—conduct surveys to determine population size, distribution and habit usage of summer run steelhead in both watersheds.
    4. SF Calawah mainstem and Lower Sitkum River sub-watersheds: ID segments in response reaches in which to monitor sediment transport from upstream mass wasting, establish permanent cross sections in order to collect data on substrate composition, stream discharge, X-section profiles, W/D ratios, etc. Conduct modified habitat surveys to monitor changes n residual pool D and pool volume.
- Sitkum/SF Calawah WSA (federal and tribal process) on table 3.1B, regarding restoration (called "Guidance"), makes numerous restoration recommendations for *silvaculture manipulation*, to control slides and to replace alders with conifers. While this is USFS land, a project could be developed through the tribal co-manager or an NGO.
- North Fork of Calawah—restoration Matrix of WSA (combined state, federal, and tribal process, 1997), on table 4 indicates a number of recommended opportunities. LWD placement in conjuncture with silvaculture manipulation are recommended for Davies Creek at 06G, Streams 0183A and 0184A, 06Y, and 06Z; Lower Mainstem of –6A1, Middle Mainstem 06A2, upper Mainstem 06A3, Mainstem Headwaters 06A4; L, M, and U Mainstem –6A1—6A3, Albion Creek 06C; Western Cool creek 06E, Eastern Cool Creek 06D; Pistol Creek 06B, and Bonidu Creek 06F.

- Repair known fish passage blockages. #s22, 24, and 30 on list of 73 in Limiting Factors Analysis of 2000. For Calawah, survey of fish use before fixing passages, as there may be more on the list after doing first bullet. Also, stream bank stabilization more urgent need.
- Lack of LWD – Low levels of LWD can be found in many areas of the South Fork drainage.—p. 11 LFA.. No plans for project to replace this in near future.
- Warm Water Temperatures - Warm water temperatures are a documented problem in the South Fork Calawah. Monitoring not currently an authorized SRFB project.

Note: The reader should refer to Appendix E within this Project Strategy for a list of the major limiting factors in the Quillayute Basin.

Quillayute Basin Restoration Projects
Quillayute Mainstem/Estuary
31 July 01

Recovery Type	Activity or Concept	Citation
1. Assessments:	Analysis similar to watershed analysis is needed for Quillayute River.	Limiting Factors P.129

Quillayute Basin Restoration Projects
Bogachiel Sub-Basin
31 July 01

Recovery Type	Activity or Concept	Citation
1. Data gaps:	Fish distribution, stream and wetland mapping.	Limiting Factors P.126.
2. Barriers:	S.F. Maxfield Ck. Will be being identified in the Quileute Tribe's fish dist. Project on the Lower Bogachiel. Located on the Goodman 3000.	
3. Barriers:	Mill Creek culvert on Russell Rd.Listed as needed repair in Quileute's List due to high number of species using stream.	
4. Barriers:	Culvert #'s 16,17,45,46,70 More info will come along the further Q.N.R. gets on its fish dist project.	Limiting Factors P. 49-53.
5. LWD/ Riparian:	Restoration on blowdown. In highly productive fish streams.	
6. Data Gap:	Instream data needed for Bogachiel river.	Limiting Factors P.127
7. Data Gaps:	Riparian data needs to be analyzed for the Bogachiel.	Limiting Facotrs P. 68,128
8. Data gaps:	Assessments are needed to map the entire CMZ/100 year floodplain.	Limiting Factors P. 127
9. Data Gap:	Specific habitat data on sedimentation, streambed conditions & LWD.	Limiting Factors P.61

Note: This list may be updated at a later date due to the fact that there is an ongoing fish distribution project for the Bogachiel river.

Quillayute Basin Restoration Projects
Calawah Sub-basin
31 July 01

Tributary	Recovery Type	Activity or Concept	Citation
North Fork Calawah	1. Data Gaps:	Survey for blockages	Limiting Factors P. 127
	2. Data Gaps:	Fish Distribution, previous typing and mapping outdated.	
	6. LWD:	Restoration on Blowdown in highly productive streams.	
	8. LWD:	Engineered log jams and LWD placement on mainstem.	Watershed Analysis P.39-40, Limiting Factors P.64
	10. LWD:	LWD placement on Devils Ck.	Watershed Analysis P. 39
	12. LWD:	LWD placement Albion Ck.	Watershed Analysis P.41
	14. LWD:	LWD Placement Albion Ck.	Watershed Analysis P.41
	15. Barrier:	WRIA#20-0175X	Limiting Factors P.50

South Fork Calawah	3. Data Gap:	Culvert Inventory. Survey for blockages	Watershed Analysis P.(2.4-13); Limiting Factors P.127
	4. Data Gap:	S.F. Calawah & Lower Sitkum River (identify segments in which to monitor sediment transport from upstream mass wasting.)	Watershed analysis P.2.6-31
	5. Data Gap:	S.F. Calawah and Sitkum River, conduct survey to determine population size, distribution and habitat usage of Summer Streelhead.	Water.Anal. P.2.6-31
	7. LWD:	Restoration on blowdown in highly productive streams.	
	9. LWD:	Hyas Ck. LWD placement Seg#B1-B7, B51,B52,B71,B3A	Watershed Analysis P. 2.6-30, Limiting Factors P.118
	11. LWD:	S.F. Calawah River LWD Placement.	Limiting Factors P.118
	13. LWD:	Sitkum River LWD placement.	Limiting Factors P.118
	16. Off-Channel:	Huas Ck.	USFS Phil DeCillis

Quillayute Basin Restoration Projects
Soleduck Sub-Basin
31 July 01

Recovery Type	Activity or Concept	Citation
1. LWD:	Restoration on blowdown in highly productive streams.	
2. Barriers:	Culvert #'s 8,10,13-15,20,21,23,28,29,36,42,43,44,47,53, 56,58-60,69	Limiting Factors P. 48-53
3. LWD:	Mainstem Log Jams at approx. RM 19 construct log jam on Soleduck river along Ted Spoelstra's land.	
4. Barrier:	Goodman Ck. Log jam due to logging. Impassible and blocking 4-5 miles spawning habitat.	WDFW observations
5. LWD:	Lower Lake Ck. Log Jams	
6. LWD:	Shuwah Ck.	Watershed Analysis P. 3-23
7. LWD:	Bear Ck.	Watershed Analysis P.3-22
8.LWD:	Beaver Ck.	Watershed Analysis P. 3-22
9. LWD:	Maxfield Ck.	Watershed analysis P.3-23
10. LWD:	Bockman Ck.	Watershed Analysis P.3-22
11. LWD:	Camp Ck.	Watershed Analysis P.3-20
12. Barrier:	Camp Ck. Culvert	Watershed Analysis P.3-20
13. Off-Channel:	Upper Redoubt Ck. Reestablish or improve passage through .75 river mile reach.	Watershed Analysis P.3-21 Table 3.1A

Note: Project #'s 6-11 are all LWD placement projects and could be lumped. These projects are noted in Limiting Factors on pages 60&61. LWD conditions low on mainstem South Fork Soleduck, Tom, Bear, Lake, Beaver, Bockman, Tassell, Gunderson, Shuwah, and South Bear Creeks.

Quillayute Basin Restoration Projects
Dickey Sub-Basin
31 July 01

Recovery Type	Activity or Concept	Citation
1. Barrier:	Culvert#'s 1,2,5,7,11,12,18,19,25,26,27,31,32,33,34,35,37,38, 39,40,41,42,48,49, 50,51,52,54,55,61,62,63,64,65,66,67,68	Limiting Factors P. 48-53
2. Data Need:	Tribs. From mouth up to confluence of East & West Forks, fish distribution and mapping is needed.	
3. LWD:	Restoration on blowdown. In highly productive streams.	
4. Data Needs:	Channel stabiltiy assessment, w/LWD redistribution after 1999 flood.	
5. LWD:	Middle Fork Dickey LWD placement.	
6.LWD:	LWD projects for enhancing spawning gravel.	
7. Riparian:	Middle Fork Dickey, take out hardwoodsas dominant riparian Seg#W15,W18&19	Watershed Analysis Map D-1
8. Riparian:	Multiple other segments off of Watershed Analasis Map D-1	
9. Riparian:	Manipulation of alder to conifer. Matrix of restoration opportunities P.2	WRIA#20 Watershed Analysis

Appendix E

North Olympic Peninsula Lead Entity Limiting Factor & Action Recommendation Priorities by Geographical Unit or Sub-Unit

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WRIA 17 (Sequim Bay)

Sequim Bay and Jimmy-Come-Lately Basins - Project Sponsors should refer to the recommendations from the Eastern Strait of Juan de Fuca – Hood Canal Summer Chum Plan (and other more recent assessments) for guidance in selecting projects within the Sequim Bay and Jimmy-Come-Lately geographical units.

WRIA 18 East

The following is a summary of the action recommendations of the Washington State Conservation Commission's Technical Advisory Group (TAG) for each of the geographical units or sub-units in WRIA 18, based on the limiting factors analysis. The reader should note that updated limiting factor information is noted in ***bold-italic*** type. A more detailed description of the habitat limiting factors and the action recommendations in WRIA 18 can be found in the "Salmon and Steelhead Habitat Limiting Factors for WRIA 18" published by the Washington State Conservation Commission. Action recommendations should only be used to provide project focus if a Prioritized List of Activities and Concepts is not available for a geographical unit or sub-unit.

Note: NOPLE recognizes that low nutrient levels, in most NOP watersheds, are pervasive.

Bell Creek 18.0001:

Priorities:

1. County/City should adopt and implement a stormwater strategy for this rapidly developing watershed that will remediate current stormwater effects and minimize additional future effects

2. Stabilize the Highland Irrigation Ditch to ensure stability during high flow events to avoid potential for fine sediment contribution to Bell Creek

3. Restore the lower, channelized reach of Bell Creek (downstream of Schmuck Road) and properly integrate with the estuary. Restoration must included removal of dikes, meandering of the channel, excavation of pools, and additions of Large Woody Debris (LWD)

4. Assess LWD status in Bell Creek and tributaries; develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

5. Restore functional riparian zones throughout the watershed, and identify and correct areas affected by unrestricted animal access

6. Complete comprehensive barrier inventory for Bell Creek, prioritize, and implement correction measures.

7. Review proposal to release treated Class-A water into Bell Creek and ensure any release does not adversely affect channel conditions or salmonid habitat.

Referrals:

- WDFW should actively enforce screening requirements on the irrigation diversion upstream of Carrie Blake Park
- HB 2514 Planning Unit should review instream flow concerns and investigate alternatives for ensuring instream flow

Gierin Creek 18.0004

Priorities:

1. Pursue removal of the tidegate and restoration of saltmarsh habitat in the estuary, including returning Gierin Creek to its former meandering location, which essentially bisected the marsh

2. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

3. Restore functional riparian zones throughout watershed, particularly upstream of Holland Rd., and identify and correct areas affected by unrestricted animal access

Cassalery Creek 18.0015

Priorities:

1. Develop and implement a strategy for restoring estuarine processes and fish passage in Cassalery Creek

2. Complete comprehensive barrier inventory for Cassalery Creek (particularly upstream of Woodcock Rd.), prioritize, and implement correction measures

3. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

4. Restore functional riparian zones throughout the watershed, and identify and correct areas affected by unrestricted animal access

Referrals:

- Department of Ecology should conduct a comprehensive assessment of water diversions from Cassalery Creek, determine consistency with water rights, and enforce against unauthorized water withdrawals

- The need to establish and ensure instream flows in Cassalery Creek should be referred to the HB 2514 Planning Unit

- Department of Ecology should regularly monitor for chlorine presence downstream of Sunland Sewage Treatment Plant; remediate if necessary

Cooper Creek 18.0017

Priorities:

1. Modify the tidegate to allow significantly greater tidal flux into the Cooper Creek estuary

2. Modify or remove the water level control structure in the estuary to allow unimpeded fish passage

3. Restore the stream to a meandering configuration, utilizing historic natural channel, where practicable

4. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

5. Restore functional coniferous riparian zones

Dungeness River 18.0018

The Dungeness River Restoration Workgroup has developed a habitat restoration strategy for the lower 10.8 miles of the Dungeness River (Dungeness River Restoration Workgroup 1997). Several of the following salmonid habitat restoration action recommendations for the Dungeness River, directly result from their efforts. These action recommendations are not ranked, although the TAG indicates that sequencing of several of the recommendations is critical to habitat restoration success. In particular, it is critical to address problems associated with forest roads in the headwaters, and to restore functional floodplain processes (in the lower 2.6 miles of the Dungeness and upstream) early on to better ensure success of other important habitat restoration actions.

Note: Detailed reach-specific action recommendations developed by the Dungeness River Restoration Workgroup are included in the Dungeness River "Blue Book" (Dungeness River Restoration Workgroup 1997). The action recommendations, listed below, are not ranked:

- Provide necessary maintenance/restoration on forest roads in the upper watershed (and tributaries) to minimize potential of sediment delivery downstream. Numerous roads have remaining areas that are at very high risk of failure, and should receive immediate attention, and consideration for abandonment. Reduce forest road densities to <2.4 mi/mi 2 , which is the identified road density threshold of concern identified in the Federal Watershed Analysis. (A *Critical Need)*

- Reestablish functional channel and floodplain in the lower 2.6 miles through dike management and constriction abatement (Dungeness River Restoration Workgroup 1997) (A *Critical Need*)

- Abate man-made constrictions upstream of the Corps dike (everything upstream of RM 2.6) (Dungeness River Restoration Workgroup 1997)

- Restore functional riparian zones throughout watershed, and identify and correct areas affected by unrestricted animal access. Restore suitable riparian vegetation and riparian adjacent upland vegetation (Dungeness River Restoration Workgroup 1997)

- County should adopt and implement a stormwater strategy for this rapidly developing watershed, including tributaries, that will remediate current stormwater effects and minimize additional future effects

- Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

- Manage sediment to stabilize the channel and reduce the risk of flooding (Dungeness River restoration Workgroup 1997)

- Construct and/or protect side channels (Dungeness River Restoration Workgroup 1997)

- Conserve instream flows (Dungeness River Restoration Workgroup 1997). Review instream flow needs for the various salmonid species, as evaluated by the IFIM study, to determine critical periods and flows (Jamestown S'Klallam Tribe 1992).

- Implement the recommendations of the Dungeness/Quilcene Plan, including the adoption of instream flows for the Dungeness River and development and implementation of a plan to restore flow. Identify and recommend in-stream flow needs to the HB2514 Planning Unit for implementation.

- Improve efficiency of irrigation distribution network and commit conserved water to instream flow through incorporation into the Trust Water Rights process. Develop water use plan to reduce dependence on shallow groundwater withdrawals (Jamestown S'Klallam Tribe 1992).

- Develop and implement a strategy to restore estuarine functions and habitat

Dungeness Tributaries

Meadowbrook Creek 18.0020 (Historic Tributary)

Priorities:

1. Restore functions of historic wetlands associated with lower Meadowbrook Creek.

2. Identify and correct areas affected by unrestricted animal access

3. Increase the span of the Sequim-Dungeness Way bridge to improve floodplain function

4. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

5. Restore functional riparian zones throughout watershed

Matriotti Creek 18.0021

Priorities:

1. County should adopt and implement a stormwater strategy for this rapidly developing watershed, including tributaries, that will remediate current stormwater effects and minimize additional future effects

2. Restore functional channel conditions between Runnion Road and Old Olympic Highway

3. Identify and correct areas affected by unrestricted animal access

4. Cease the release of fine sediment-laden stormwater from irrigation delivery systems to Matriotti Creek

5. Complete comprehensive barrier inventory for Matriotti Creek, prioritize, and implement correction measures

6. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

7. Restore functional riparian zones throughout watershed

Referrals:

- Refer restoration of tributary flows to Matriotti Creek (between Hooker and Atterberry roads) to the HB2514 Planning Unit for resolution

Hurd Creek 18.0028

Priorities:

1. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

2. Restore functional riparian zones throughout watershed, particularly on WDFW-owned hatchery property

Bear Creek 18.0030

Priorities:

1. Monitor fish passage conditions at and downstream of the low irrigation dam; maintain function of the Bear Creek alluvial fan.

2. Identify and correct areas affected by unrestricted animal access, fence and revegetate to reestablish functional riparian zones throughout the watershed

3. The Agnew Irrigation Company should cease the release of fine sediment-laden stormwater flows to Bear Creek

4. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

Canyon Creek 18.0038

Priorities:

1. At a minimum, restore fish passage past the water intake dam, with dam removal as the preferred option to restore biological processes

2. Evaluate restoration potential of historic lower portion of Canyon Creek, through the terrace immediately adjacent to the Dungeness River; implement as practicable

3. Evaluate potential to stabilize active slide upstream of dam

4. Restore natural sediment transport downstream of dam

5. Introduce LWD to the channel downstream of the dam to retain river gravels, provide habitat diversity, and restore spawning habitat

6. Protect intact riparian zones upstream of the dam, restore functional riparian zones downstream of the dam

Caraco Creek 18.0046

Priorities:

1. Reduce the forest road density in the Caraco Creek watershed,

2. Maintain remaining forest roads in a manner that minimizes potential of mass wasting and fine sediment erosion

Gray Wolf River 18.0048

Priorities:

1. Maintain riparian condition in Gray Wolf canyon

2. Evaluate the forest road network in the watershed and implement actions necessary to prevent entry of fines and mass wasting events to the Gray Wolf River

Gold Creek 18.0121

All recommendations are of equal importance.

- Maintain forest roads in a manner that minimizes potential of mass wasting and fine sediment erosion

- Identify and map deep-seated failures and areas prone to shallow-rapid landslides; prevent land use activities (roads and harvest) that will exacerbate sediment contribution from these areas

- Restore resident fish passage at road-stream crossings.

- Restore natural channel characteristics in gabion-controlled section of lower basin

- Maintain >60% of watershed in a condition that provides hydrologic maturity (>age 25) (Wild Salmonid Policy)

- Restore forest road density to <2.4 mi/mi 2 , which is the threshold density of concern identified in the Federal Watershed Analysis; confine roads to areas not sensitive to mass failures

Silver Creek 18.0131

All recommendations are of equal importance.

- Restore stability of slide prone areas; ensure road cross-drainage is maintained; consider abandonment of roads located on active and potential slide areas; provide sediment detention BMPs on active slides where practicable

- Avoid future road construction on slide prone areas

McDonald Creek 18.0160

Priorities:

1. Evaluate cause of channel instability and develop and implement a corrective plan

2. Reforest timber harvested areas in the rain-on-snow zone; ensure that future timber harvest is done in a manner that maintains hydrologic maturity in the upper watershed

3. Restore LWD presence and function from the mouth upstream to the mouth of Pederson Creek (RM 4.9) ; addition of LWD in upper watershed to provide channel and bank stability may also be beneficial

4. Monitor/restore landslides on USFS lands

5. Identify options to reduce/eliminate the influence of Dungeness River water, conveyed through the irrigation system, on homing ability of Dungeness and McDonald origin salmonids

Siebert Creek 18.0173

Priorities:

1. Reduce the flow energy increase that resulted from removal of the culverts at Old Olympic Highway

2. Develop and implement a short-term LWD strategy in lower Siebert Creek to restore LWD presence and pools, particularly from the mouth to Highway 101

3. Abandon/relocate the forest road on East Fork

4. Restore stability of slide prone areas; ensure road cross-drainage is maintained; consider abandonment of roads located on active slide areas; provide sediment retention BMPs on active slides where practicable

Bagley Creek 18.0183

Priorities:

1. Limit conversion of upper watershed to non-forest cover

2. Evaluate fish passage through logjams in lower Bagley Creek and implement remedial modifications, where warranted (Mike McHenry)

3. Provide unrestricted fish passage through the Highway 101 culvert and correct the additional two fish passage barriers upstream

4. Prevent animal access to channel upstream of Highway 101 and restore functional riparian zones through this area

5. Replace the lowermost culvert on Bagley Creek Rd. to prevent backwatering during peak flow events and bank erosion and sediment deposition upstream of the culvert

6. Restore LWD presence throughout the channel. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored.

7. Adopt and implement instream flow requirements

Morse Creek 18.0185

These are ranked with equal importance, although it is recognized that floodplain recovery will likely be needed in order for LWD restoration efforts to be successful. LWD restoration could be locally successful upstream of Four Seasons Park independent of floodplain recovery efforts. LWD restoration efforts should focus on recruitment of key piece sized conifer capable of remaining stable in the channel, creating in-channel diversity, and retaining gravel and smaller LWD.

- Restore floodplain function downstream of RM 1.7, including the removal/pull back of dikes, elimination of floodplain constrictions, and restoration of natural banks

- Restore LWD presence throughout the channel downstream of the natural falls at RM 4.9; develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored; ensure that LWD is passed downstream of the railroad trestle

- Reestablish estuarine characteristics and function similar to historic conditions

- Restore riparian function by encouraging conifer regeneration in deciduous stands that historically had a conifer component

- Restore drift processes and recruitment of marine sediments to the west of Morse Creek.

Lees Creek 18.0232

These actions are ranked in order of salmonid habitat restoration importance.

1. Improve passage conditions, initially at Highway 101 and at RM 0.1, and subsequently at other locations

2. Restore riparian presence and function, develop and implement a short-term LWD recovery strategy, and fence livestock away from the channel in agricultural areas on both the East and West forks

3. Identify and remove/correct floodplain constrictions

4. Evaluate flow and water quality impacts of runoff from the mill landfills, Highway 101, and agricultural areas of concern; remediate identified problems

5. Educate landowners in the watershed on the importance of providing functional salmon habitat, particularly in regard to LWD, riparian vegetation, and preventing animal access to the channel

Ennis Creek 18.0234

These actions are ranked in order of salmonid habitat restoration importance.

1. Restoration of natural floodplain function in the lower channelized portions of Ennis Creek

2. Restoration of the Ennis Creek intertidal estuary

3. Secure passage through Highway 101 by maintaining fishway/replace culvert with bridge

4. Collect and treat stormwater from Highway 101 and other impermeable surfaces

5. Restore damaged riparian areas and LWD presence and function throughout the channel

6. County/City should monitor water quality in the vicinity of the golf course

Peabody Creek 18.0245

Although Peabody Creek historically supported coho and possibly chum salmon, the number and magnitude of limiting factors result in little restoration potential for the stream as it currently exists. Restoration would require extensive culvert removal, extensive stormwater retrofit, and property acquisition in heavily urbanized portions of Port Angeles. Restoration should be considered for continued support of cutthroat, water quality, and other salmonids but may rank low for salmon and steelhead in comparison to restoration benefits in other streams in WRIA 18. The following action recommendations are not ranked:

- Correction of passage problems
- Collection and treatment of stormwater
- Removal of instream fill on ONP lands
- LWD/Riparian improvement projects

Valley Creek 18.0249

The TAG agrees with the recommendations of the conceptual restoration plan for Valley Creek (McHenry and Odenweller 1998). This report establishes strategies for the watershed that include:

- Improve passage conditions and eliminate large reaches of culverts
- Restore the lower ¾ mile of stream by re-meandering , restoring LWD, and recreating pools to the maximum extent possible
- Reestablish floodplain process by reducing or eliminating floodplain constrictions, particularly downstream of Highway 101
- Remediate stormwater management in the watershed to collect, treat, and discharge stormwater in a manner that avoids adverse impacts to Valley Creek and other surface waters
- Restore riparian vegetation communities and instream large wood

In addition to these goals, the TAG recommends obtaining natural floodplain easements or land acquisition downstream of Highway 101. Such easements or land acquisition would facilitate restoration by allowing enough physical space to accommodate floodplain and riparian rehabilitation measures. A critical piece of property, north of Highway 101 was recently donated to the City of Port Angeles in 1998. This property includes 0.5 miles of stream corridor that was previously platted for development.

Tumwater Creek 18.0256

These actions are ranked in order of salmonid restoration importance.

1. Remediate stormwater management in the watershed to collect, treat, and discharge stormwater in a manner that avoids adverse impacts to Tumwater Creek and other surface waters; particular attention should be given to eliminating stormwater discharges that are creating major sediment contribution off Black Diamond Road, and taking measures to stabilize erosion from the gully

2. Restore functional estuary processes

3. Remove channel constrictions in the lower channel and restore functional floodplain processes

4. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

5. Restore functional riparian zones throughout the watershed

Dry Creek 18.0265

These actions are ranked in order of salmonid restoration importance. In addition, the effects of the pipeline crossing on sediment transport should be further investigated.

1. Remediate stormwater impacts to the channel; ensure that stormwater impacts resulting from future construction in the watershed are fully addressed at the time of construction

2. Prevent further head-cutting in relocated reaches of Dry Creek

3. Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity until full riparian function is restored

4. Restore functional riparian zones throughout the watershed

Elwha River 18.0265

The following represents updated Limiting Factor Analyses information on the Elwha River. The reader should note that these major recommendations are not ranked.

- Implementation of the Elwha River Restoration Act

- Perform significant restoration actions that help prepare the lower Elwha River for dam removal

    - ✓ Identify solutions to selected dikes and other channel constriction problems
    - ✓ Riparian restoration
    - ✓ Acquisition/conservation easement for access and set back of structures constructed within the channel migration zone
    - ✓ Systematic restructuring of the lower and middle river with large woody debris
    - ✓ Other similar projects that are deemed appropriate

WRIA 18 Nearshore & Subtidal Marine Areas

These marine habitat action recommendations are not ranked; all are considered important to support the anadromous salmonid resources of WRIA 18 and other major watersheds that use the nearshore areas.

- Restore drift processes and recruitment of marine sediments from the Elwha River and between the Elwha River and the west-end of Ediz Hook.

- Restore drift processes and recruitment of marine sediments to the west of Morse Creek.

- Minimize the growth of *Ulva (spp)* by eliminating point and non-point source nutrient delivery to shallow embayments with limited tidal flushing

- Evaluate the effects of shoreline armoring on shoreline sediment transport and nearshore sediment composition, and implement corrective actions, where appropriate

- Modify log-booming practices in Port Angeles Harbor to eliminate the accumulation of wood debris on the bottom of the harbor and restore subtidal substrate conditions that are affecting dissolved oxygen in the waters of the harbor and benthic production in areas affected by accumulations of wood waste

- Restore unrestricted tidal flow and flushing to the north end of Washington Harbor

- Study the removal or reconfiguration of the Rayonier pier to provide unrestricted nearshore salmonid migration and longshore sediment transport

North Olympic Peninsula Lead Entity
Major and Minor
Habitat Limiting Factors
by Geographical Unit or Sub-Unit

WRIA 19

Many of the major-limiting factors are similar throughout the WRIA, and several factors are often the result of a few causes. Because of this, the Washington State Conservation Commission's Technical Advisory Group (TAG) for WRIA 19 recommends the following actions for the entire WRIA to help address some of these widespread, complex factors that stem from similar causes. The reader should note that updated limiting factor information is noted in ***bold-italic*** type.

- Enforce current environmental regulations, such as the Hydraulic Code, Forest Practices Act, Shoreline regulations, Critical Area Ordinances, and Growth Management Act.
- Revise the Growth Management Act to protect salmon habitat.
- Protect the channel migration zone (floodplain) habitat. Floodplain development leads to a loss of riparian forest and loss of future LWD. It also increases sedimentation, channel instability, and water quality problems.
- Protect conifer riparian areas.
- Convert open and hardwood riparian areas to conifer.
- Increase off-channel habitat.
- Increase instream LWD, preferably with attached rootwads.
- Stop the removal of instream wood.
- Prevent the increase of water withdrawals. These can have a large impact on salmon because of the naturally low flow conditions in the summer and early autumn.

- Set up a State/Tribal/County committee to identify and purchase critical salmon habitat for conservation and to address problem areas.

- ***Increase stream nutrient levels***

The following is a summary of the action recommendations for each of the geographical units or sub-units in WRIA 19, based on the limiting factor analysis. The reader should note that updated limiting factor information is noted in ***bold-italic*** type. A more detailed description of the habitat limiting factors in WRIA 19 can be found in the "Salmon and Steelhead Habitat Limiting Factors for WRIA 19" published by the Washington State Conservation Commission. Action recommendations should only be used to provide project focus if a Prioritized List of Activities and Concepts is not available for a geographical unit or sub-unit.

Hoko River

Major Limiting Factors:

- Excess sedimentation from Roads and Clearcuts - The sedimentation has led to channel instability and a change in substrate to less suitable spawning gravels.

- Severe Lack of Large Woody Debris (LWD) - Sediment transport and water velocity effects are worsened by a severe lack of large woody debris (LWD). Many riparian areas are dominated by hardwoods, and will not contribute to future LWD. Also, it is believed that the change in age and type of surrounding forests contributes to an increased frequency and severity of peak flows.

- Encroachments to the Floodplain – These encroachments are from riparian roads and an old railroad grade in the mainstem, as well as dikes and channelization in the Little Hoko River. These floodplain impacts constrain the channel, reduce side-channel habitat, and reduce riparian vegetation and associated LWD recruitment. In addition, riparian roads also contribute to excessive sedimentation.

- Low Flows in the Summer and Early Autumn - Low flows contribute to high water temperatures and limit the spawning distribution of fall chinook to less stable areas of the mainstem, possibly increasing the likelihood of scour during peak flow events. The naturally low flows are worsened by water withdrawals.

Minor Limiting Factors:

- Blockages - Improving culverts would increase coho and steelhead habitat, but would not address the large problems in the mainstem that impact all salmonid species.

- Estuarine Habitat Alteration - The estuarine habitat has been altered by sediment deposition in recent history. The effects of the estuarine sediment deposition on salmon are unclear.

Sekiu River

Major Limiting Factors:

- Sedimentation from High Road Densities and Mass Wasting Sites - The sedimentation has led to debris flows that have incised the mainstem channel and removed LWD. The mainstem provides critical rearing habitat as well as spawning habitat for all salmon species in that watershed. The floodplain impacts to the mainstem such as the Mainline and other riparian roads have greatly impaired salmon production through an increase in channel instability (constrictions), increased sediment, loss of riparian vegetation, and loss of off-channel habitat.

- Riparian Alteration and Forest Management Activities – These alterations and activities have resulted in a lack of LWD and deep pools, extensive riparian areas that are dominated by hardwoods, and reduced the age of the surrounding forests.

- Water Quality Impacts - The alteration of riparian in the mainstem and South Fork has resulted in high summer water temperatures, while the forest management activities have contributed to increases in water turbidity.

Minor Limiting Factors:

- Blockages – Fish passage problems have mostly impacted coho and steelhead.

Pysht River

Major Limiting Factors:

- Sedimentation from Roads and Mass Wasting - Sedimentation from roads and mass wasting sites have lead to channel instability, especially in the mainstem.

- Lack of LWD – Lack of LWD has resulted in increased channel instability and peak flow impacts as well as decreased pool habitat formation and spawning gravel storage.

- Conversion of Riparian Areas from Conifers to Open Areas or Hardwoods - The conversion of a conifer riparian to open areas and hardwoods has limited future LWD supplies and increased water temperatures.

- Floodplain Impacts - Severe floodplain impacts, particularly from Highway 112, contribute to sediment problems, reduce riparian vegetation, and increase channel instability. The removal of trees along riparian roads also reduces important riparian vegetation for salmon.

- Severe Peak Flows – It is believed that changes in the age and type of surrounding forests can contribute to the increased frequency ~~***and severity***~~ of peak flows.

Minor Limiting Factors:

- Channelization – The lower mile and a half of the mainstem has been channelized.

- Estuarine Sediment Impacts - Excessive amounts of sediment have been delivered to the estuary.

- Loss of Eelgrass Habitat - Members of the TAG believed that there may have been a loss of eelgrass habitat in the estuary, but historical data are not available to demonstrate this.

- Blockages (Human-Caused)

Clallam River

Major Limiting Factors:

- Excessive Sedimentation

- Lack of LWD

- Open or Hardwood Riparian Area - The altered riparian has contributed to high water temperatures in the summer.

- Floodplain Impacts - Significant floodplain impacts include gravel bar scalping and riparian road impacts.

- Loss of Saltmarsh

- Severe Peak Flows – It is believed that changes in the age and type of surrounding forests can contribute to the increased frequency and severity of peak flows.

Minor Limiting Factors:

- Blockages – Fish passage problems have mostly impacted coho and steelhead habitat.

Data Needs:

- Intermittent River Mouth Blockage - Some members of the TAG expressed concern about the intermittent blockage near the mouth caused by gravel, however the problem and potential solutions are not well-understood and need to be studied before restoration activities are planned for this issue. (Note: It was not clear, in reading the Limiting Factors Analyses for WRIA 19, whether the TAG considered this to be a major or minor problem in the Clallam River.)

Deep Creek

Major Limiting Factors:

- Excessive Sedimentation - Debris flows have resulted in extensive channel incision and instability. Large woody debris is lacking, and the conversion of riparian vegetation from old conifers to hardwood or open areas results in a future lack of LWD as well as high water temperatures. Channel incision has contributed to floodplain impacts such as a lack of off-channel habitat, and this lack of off-channel habitat has severely impacted all salmonid species in Deep Creek. The excessive sedimentation has also impacted the estuary, where the delta has increased in recent years.

- Forest Conversion to Young Conifers - The lack of older trees is thought to increase the frequency and severity of peak flow events. Channel incision and the lack of instream LWD worsens water velocities.

Minor Limiting Factors:

- Blockages

Twin Rivers (East and West)

Not much is known about current habitat conditions in the Twin Rivers. It is believed that the following limiting factors might be important:

- Lack of LWD – LWD is lacking in the lower reaches.
- Excessive Sedimentation from Roads
- Blockages - Fish passage is an issue in the East Fork of the East Twin River.
- Estuarine Impacts - Estuarine impacts exist near the mouths of both Twin Rivers.

Lyre River

Major Limiting Factors:

- Fine Sediments - The Lyre River has been impacted with fine sediments from Boundary and Susie Creeks. The fines have degraded spawning habitat and increased water turbidity.
- Altered Riparian Areas – The riparian areas along Nelson Creek are alder-dominated.
- Lack of LWD - Nelson Creek, Susie Creek, and the lower mainstem are lacking LWD.
- Mainstem Channelization – The lower mile of the mainstem is channelized.
- "Stream cleaning" - Removal of LWD, or "Stream Cleaning" contributes to the lack of LWD in this river.

Minor Limiting Factors:

- Blockages

Salt Creek

Major Limiting Factors:

- Lack of LWD - The greatest salmon habitat problem in Salt Creek is the lack of LWD, which has resulted in a loss of holding pools for salmon.
- Land Conversion - The following problems are likely the result of land conversion to accommodate development. Development in the floodplain has altered the riparian, and efforts to return the riparian to old conifers should be encouraged.

- ✓ Increased demand for water,
- ✓ Unauthorized water withdrawals,
- ✓ Excess sedimentation.

- Loss of Saltmarsh – The saltmarsh in the estuary was lost due to road impacts.

Minor Limiting Factors:

- Blockages – Fish passage problems have reduced coho and steelhead habitat.
- Floodplain Impacts due to Riparian Roads

East-End WRIA 19 Streams

The small salmon-producing streams in the east-end of WRIA 19 include Colville, Field, Whiskey, Murdock, Jim and Joe Creeks.

Major Limiting Factors:

- Lack of LWD
- Conversion of the Riparian Zone to Alder or Open Areas.
- Excessive Sedimentation – Excessive sedimentation is believed to be a problem in Whiskey, Field, Jim, and Joe Creeks.
- Blockages – Fish passage problems are known to exist in Colville, Field, Jim, and Joe Creeks.
- Estuarine Impacts – Estuarine impacts have occurred near Whiskey and Jim Creeks.

West-End WRIA 19 Streams

The small salmon-producing streams of the west-end of WRIA 19 include the Sail River and Agency, Jansen,, Rasmussen, Bullman, Snow, and Village Creeks.

Major Limiting Factors:

- Lack of LWD – LWD is lacking in Agency and Jansen Creeks, as well as in the Sail River.

- Conversion of Riparian Areas – Riparian areas have been converted in Rasmussen, Bullman, and Jansen Creeks, and the Sail River.

- Excessive Sedimentation from Roads – Excessive sedimentation from roads is a problem in Snow, Rasmussen, Bullman, and Jansen Creeks. In Jansen Creek, the resulting turbidity from roads is a significant problem.

- Blockages – Fish passage problems are known to exist in Agency and Village Creeks and the Sail River.

- High Water Temperatures - High water temperatures have been documented in Agency and Rasmussen Creeks.

- Sediment Impacts on Eelgrass Habitat - In the nearshore environment, sediments from Highway 112 are impacting eelgrass habitat.

North Olympic Peninsula Lead Entity

A Summary of the Major Habitat Limiting Factors by Geographical Unit or Sub-Unit

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WRIA 20

The following is a summary of the action recommendations of the Washington State Conservation Commission's Technical Advisory Group (TAG) for each of the geographical units or sub-units in WRIA 20, based on the limiting factor analysis. The reader should note that updated limiting factor information is noted in ***bold-italic*** type. A more detailed description of the habitat limiting factors in WRIA 20 can be found in the "Salmon and Steelhead Habitat Limiting Factors for WRIA 20" published by the Washington State Conservation Commission. Action recommendations should only be used to provide project focus if a Prioritized List of Activities and Concepts is not available for a geographical unit or sub-unit.

Note: NOPLE recognizes that low nutrient levels, in most NOP watersheds, are pervasive.

Waatch and Sooes Basins

Blockages – Numerous fish passage problems exist throughout these basins with riparian road floodplain impacts for Snag Creek and Thirty Cent Creek in the Sooes.

High Water Temperatures - Specific data to assess the cause of the warm temperatures were not found.

Lack of Marine Derived Nutrients - Stock status for many species is depressed, suggesting a lack of marine-derived nutrients.

Ozette Basin

Numerous "poor" habitat conditions exist in the Ozette Basin and they appear to be linked.

- Lack of LWD - The Ozette River, which drains the lake to the ocean, has been cleared of LWD. This lack of LWD has been suggested to contribute to reduced water level fluctuations in Lake Ozette which could be linked to vegetation encroachment and loss of beach spawning habitat. "Poor" LWD conditions exist in the tributaries, *e.g.*, Umbrella Creek, Big River, Siwash Creek, etc., that flow into Lake Ozette.

- Invasive Plants - Invasive plants, such as Reed canarygrass, are found along the lakeshores of Lake Ozette.

- Excessive Sediment - Sediment is a major habitat limiting factor in Lake Ozette, resulting in degraded spawning habitat for lake spawning sockeye, but the cause of the high levels of fines is uncertain. Fine sediment levels are high in Umbrella Creek, Big River, and Siwash Creek.

- Channel Incision & Bank Hardening - Some of the larger tributaries draining into Lake Ozette (Umbrella Creek, Big River, Siwash Creek) are incised with banks hardened by Reed canarygrass.

- High Road Densities - Road densities are high in this basin, likely contributing to the sediment loads.

- Riparian Conditions – "Poor"

- Warm Water Temperatures – Washington State Department of Ecology accounts for the fact that warmer water temperatures in the Ozette Basin are a natural condition. Warm water temperatures combined with a lack of LWD are believed to contribute to poor upstream migratory conditions for adult Lake Ozette sockeye.

- Poor Hydrologic Maturity

- Altered estuary

- Lack of Marine-Derived Nutrients.

Quillayute Basin

- Altered Estuary - All four sub-basins, *i.e.*, Dickey, Soleduck, Calawah, and Bogachiel, drain into ***the Quillayute mainstem, which has*** a significantly altered estuary at the mouth of the Quillayute system. The estuary is regularly dredged ***as a matter of federal law because it lies within a navigable port*** and has armored and

diked banks. Estuarine habitat is extremely limited within WRIA 20, and the Quillayute estuary is the largest estuary in the WRIA. The Quillayute estuary is located near known surf smelt (salmonid food item) spawning grounds and kelp that are important for salmonid rearing. Many upstream habitat problems are translated to the estuary and near shore habitat. Of particular concern are increased sedimentation and water flows. The increased flows are likely a result of several upstream problems, notably incised channels, reduced levels of LWD, and a loss of hydrologic maturity.

- Altered Estuary - All four sub-basins, *i.e.*, Dickey, Soleduck, Calawah, and Bogachiel, drain into a significantly altered estuary at the mouth of the Quillayute system. The estuary is regularly dredged, and has armored and diked banks. Estuarine habitat is extremely limited within WRIA 20, and the Quillayute estuary is the largest estuary in the WRIA. The Quillayute estuary is located near known surf smelt (salmonid food item) spawning grounds and kelp that are important for salmonid rearing. Many upstream habitat problems are translated to the estuary and near shore habitat. Of particular concern are increased sedimentation and water flows. The increased flows are likely a result of several upstream problems, notably incised channels, reduced levels of LWD, and a loss of hydrologic maturity.

Dickey Sub-Basin

- Excessive Sedimentation – Excessive sedimentation in the Dickey is predominantly due to roads.

- Riparian Impacts - Riparian impacts occur throughout the Dickey and are worsened because of windthrow. The strong windstorms in the winter destroy the riparian buffers left after recent timber harvest in susceptible areas.

- Warm Temperatures - Warm water temperatures are another “poor” habitat condition throughout the Dickey sub-basin, and may be contributing to an increased distribution of squawfish, known predators of salmon.

- Blockages - Blockages, such as culverts, are another major habitat problem in this sub-basin. The naturally low-gradient conditions result in a lack of natural blockages for salmonids, yet numerous culverts exist and should be addressed.

- Low Water Flows - Low water flows in the summer are thought to limit the production of salmon and steelhead. Impacts that worsen low flows include a reduction of fog drip due to a loss of older conifers within the watersheds, as well as altered wetlands due to increased road sedimentation and loss of wetland riparian vegetation.

- Lack of LWD - While historically, LWD was very abundant in these streams due to the low-gradients and hence, lack of downstream transport, LWD levels in the mainstems, especially in the East Fork Dickey River have recently decreased to low levels. Flooding in December, 1999 not only washed out LWD in the East Fork, but has also resulted in signs of channel instability.

- Poor Floodplain Conditions - Riparian roads impact the floodplain conditions in Coal and Colby Creeks.

Soleduck Sub-Basin

The Soleduck sub-basin lies partly within the Olympic National Park (upper reaches) and partly in timber-managed, agricultural, and residential development. The contrast between the pristine habitat conditions within the Park is sharp compared to conditions further downstream. Outside of the Park boundaries, numerous major habitat problems exist. These major habitat problems are summarized below:

- Excessive Sedimentation - Excessive sedimentation is a problem and stems mostly from landslides. High road densities are associated with the sedimentation problems. High levels of fine sediments are found in many Soleduck tributaries, which degrade the quality of spawning habitat.

- Lack of LWD

- Poor Riparian Conditions

- Loss of Wetlands

- Loss of Off-Channel Habitat

- Warm Water Temperatures and Low Summer Flows - Warm water temperatures are a problem in the summer, potentially impacting adult migration and spawning of summer chinook and a unique summer coho run. A large potential habitat problem is the over-allocation of water from the river. Contributing to summer low flows and warm water temperatures is the "poor" hydrologic maturity (loss of fog drip, change in hydrology) outside of the Park boundaries.

- Blockages - Blockages are a known major problem within Gunderson and Tassel Creeks.

Bogachiel Sub-Basin

Note: An assessment, currently being conducted on the Bogachiel, may require these recommendations to be updated.

- Severe Data Need - The Bogachiel sub-basin is lacking in specific data regarding many of the habitat conditions assessed in this report. Considering the number of salmon stocks and extent of salmon production from this drainage, this is a major data need.

- Poor Riparian Conditions – Poor riparian conditions exist particularly along the mainstem.

- Lack of LWD - LWD conditions are poor in the mainstem

- Excessive Aggradation – Mainstem aggradation worsens downstream.

- Collapsing Banks – Collapsing banks are a problem along the lower mainstem, and fines from exposed clay layers likely degrade spawning habitat.

- Warm Water Temperatures - Warm water temperatures are a documented habitat problem in the lower Bogachiel.

Calawah Sub-Basin

- Excessive Sedimentation – An extensive landslide problem exists in the sub-basin, mostly due to older roads but in some cases because of steep slopes (as per Quileute Tribe). Side-cast roads are a particular concern, and in general high road densities are found in the South Fork Calawah and in the headwaters of the North Fork Calawah. The excessive sedimentation is thought to contribute to dewatering in Hyas Creek, the North Fork Sitkum River, and Rainbow Creek.

- Channel Instability - Channel instability is a major problem throughout the sub-basin and is likely a result of the excessive sedimentation, low levels of LWD and riparian road impacts.

- Floodplain Impacts - Floodplain problems such as incision and riparian roads are significant in the North Fork Calawah, Cool Creek, Devil's Creek, the South Fork Calawah, and Hyas Creek.

- Lack of LWD – Low levels of LWD can be found in many areas of the South Fork drainage.

- Warm Water Temperatures - Warm water temperatures are a documented problem in the South Fork Calawah.

Hoh Basin

- A significant portion of the Hoh basin lies within the Olympic National Park, but downstream of the Park, considerable habitat problems exist. These habitat problems are summarized below:

- Debris Flows - Debris flows are common and devastating, resulting in scoured, incised channels with few spawning gravels and LWD. Channel incision has exposed clay layers that contribute fines into the streams, further degrading salmonid habitat. The sources of sediment loads are primarily mass wasting and road erosion.

- Lack of LWD

- Poor Riparian Conditions

- Blockages - Access problems from culverts and cedar spalts are numerous within the Hoh basin and are a major limiting factor. The spalts have degraded water quality, riparian and channel conditions as well.

- Floodplain Impacts - Floodplain complexes are vital habitats within the Hoh basin, providing excellent rearing and winter refuge habitat. The loss and degradation of these floodplain complexes are significant impacts. Riparian roads are another extensive floodplain problem in the Hoh basin.

- Reductions in Hydrologic Maturity - Reductions in hydrologic maturity have occurred in areas of the middle Hoh basin, and contribute to degraded floodplain habitat as well as a potentially altered flow regime. The loss of fog drip is a major concern pertaining to low summer flows in the Hoh.

Independent Streams (Goodman Creek, Mosquito Creek, and Steamboat Creek)

- Data Need - Few habitat data are available for these streams.

- Excessive Sedimentation - Biologists have noted that sedimentation is a problem in some reaches of these creeks.

- Altered Riparian Areas – Biologists have noted that some of the riparian areas have been altered along some reaches of all of these creeks.

- Blockages - Numerous blockages from either culverts or spalts have been documented in Cedar and Steamboat Creeks.

- Lack of LWD - The middle reaches of Goodman Creek have low levels of LWD.

Appendix F
North Olympic Peninsula Lead Entity Geographic Unit Map